STRUCTURE AND REALITY

A Study of First Principles

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To

MY MOTHER

JOSEPHINE WALTERS GOTSHALK

Who Laid the Foundations

PREFACE

Philosophers have many concerns, and many aims. But there is a fine phrase in Plato which sums up the philosopher's original purpose: the spectator of all time and all existence. This seems to me still valid as descriptive of the philosopher's primary aim. Philosophy is a venture in comprehensive understanding. Primarily, a philosophy is an attempt to interpret 'time and existence' by principles which can include all of it, all that is anything. Such principles Aristotle called first principles, and a knowledge of them wisdom. A philosophy, first and foremost, is a study and statement of first principles.

The general purpose of this book is to present a considered statement of first principles. The position taken is that there are three such principles: the continuant, the event, and the relation. Every item of the real is a continuant, an event, or, a relation, or, it is a complex of these, or, it is a possession, a manifestation, or a component of one or of a complex of these, and the whole of the real is an event-continuant system. All that is anything is comprehended by these three

principles, which are, in consequence, the logically supreme or prime principles of the real.

The argument of the book is developed analytically, then synoptically. The first six chapters are analytic. Each first principle is analyzed, the range of reality denoted by each is indicated, and the problems raised by an analysis of each are described and treated. The final two chapters are synoptic. The scattered results of the analysis are employed to compose a systematic or synoptic view of the real, a view which shows the way the triadic components settle into a systematic whole, and describes the characteristics that the real has in virtue of its organized wholeness.

The central aim of this argument is the elucidation and verification of our three prime principles with a view to showing that they compose a precise and inclusive descriptive scheme. Dropping preliminaries, we begin at once with the continuant principle, its denotation and connotation, we explore the range of the real it rules, showing how it rules it, and we pass to similar treatment of the principles of the event and the relation, dwelling most on relation, and so to synopsis. Thus, the central importance of this book is its value as an accurate and systematic treatment of a subject. This is the major value at which the argument explicitly aims.

Historical significance, however, is not incompatible

with a systematic work. To recur to Greek authority, Aristotle considered philosophy to be an accurate and systematic treatment of a subject, yet Aristotle's philosophy is symbolic of certain elements in the prevailing Greek culture. A philosophy is a cultural utterance, related to a particular past and present, in being a systematic work. To suggest the relation of our work to its particular past and present, is the intent of the title, and of the argument of the Appendix.

Since the Renaissance, Western Philosophy has had two epochs, one emphasizing the principle of permanence, so-called substance, the continuant; the other emphasizing the principle of change, so-called evolution, the event. A new epoch of Western culture appears to be dawning, naturally calling for a new philosophical synthesis. Signs point to the widespread importance, in the culture of this epoch, of the principle of structure, so-called sociality, the relation. The principle emphasized in this book, to which five of the eight chapters are primarily addressed, is this principle of structure, or, the relation. As our title suggests, the clue to reality is structure, and, as our argument claims, all else that is anything, in particular the continuant and the event, are understood as they really are, only in terms of their relation to each other, and as in relation.

This congruity between our outlook and a wide-

spread cultural affirmation, was clear to the writer only after completion of the systematic argument. It is understood also that the primary claim of this work, its claim to fidelity and truth, is independent of such a congruity, residing wholly in the degree of logical coherence and empirical adequacy of its descriptive scheme. Yet the congruity between our outlook and this widespread cultural emphasis, upon reflection, is so clear, and seems so natural and inevitable, both growing in a common present out of a common past, that it appears to call for the belief that the present work is a first groping step toward the great philosophical synthesis pertinent to the epoch now ascending. This is the historical significance suggested in the Appendix.

Very briefly, I wish to acknowledge my many obligations. My debt to other writers is very extensive. A mere list would hardly indicate its real nature. The text itself, the quotations and footnotes, are probably the best guide. Almost every writer mentioned has helped considerably, not the least those from whom I have felt forced to diverge. In working out the argument of this book, I have drawn material at several points from articles I have published in philosophical periodicals. I wish to thank the editors of *Mind, The Monist, The Journal of Philosophy,* and *The Philosophical Review,* for written permission to re-use this

material. Footnotes indicate the relevant articles.

Professor A. C. Benjamin, University of Chicago, read an early draft of the work years ago, making detailed suggestions and criticisms, from which I profited immensely. Professor G. R. Morrow, University of Illinois, performed a similar service with a later draft. Deans A. H. Daniels and M. T. McClure, Professors G. A. Tawney and J. A. Nicholson, Drs. P. L. DeLargy and O. A. Kubitz, as well as Professor Morrow, contributed critical discussions of the contents of the book at the 1935-1936 meetings of our department of philosophy at the University of Illinois. I wish to record my considerable debt to all these men for the liberal help offered. The Committee on Publications of the American Philosophical Association, Professor E. A. Burtt of Cornell University chairman, sponsored an application to the American Council of Learned Societies for a grant of funds to assist publication, an application which received favorable action. I wish to thank the members of this committee and the representatives of the American Council for their generous support of my work. I am also under obligation to Professor Burtt and his fellow committeemen, and to Dr. William A. Hammond of the Library of Congress, for suggestions of revision which I have utilized freely.

Finally, I wish to record my great debt and deep

gratitude to my wife for many conversations and for many sacrifices, which made possible the writing and re-writing of the book, until at length it took the form in which it is now offered to the public.

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CHAPTER I

CONTINUANTS

1. *Range.*

Probably the reality most obvious to most people is the multiplicity of things of daily life: plants and animals, buildings and persons, sun, clouds, stars, and motor cars. It is convenient to have a single term to denote this multiplicity and similar fact, and the term thing is awkward, particularly applied to persons. I have chosen the term continuant.[1] And I have chosen this term in order to emphasize an aspect of these items which is fundamental in the conception I urge, namely, that they are temporal, that they exist amid time and change, continuing.

Problems raised by this continuance will be discussed later. In this section, I wish to indicate more precisely the range of reality designated by the continuant, its empirical scope. I will sum this up by saying that the term continuant denotes at least physical things, living beings, and spiritual beings. Since this trinity is interpreted in different ways by different people, I will explain briefly the interpretation which I follow.

[1] W. E. Johnson, *Logic,* Part III, Chap. 7.

Physical things include stones and chairs, atoms and electro-magnetic fields, continents and galaxies, *etc.* Living beings include plants and animals, organisms generally. Spiritual beings include some human beings. As continuants, physical things and living and spiritual beings possess certain common fundamentals, which I will list most briefly, and later analyze at length.

First, they are energy-systems. As energy, they are in constant spatio-temporal process. As systems, they exhibit organization and self-determinacy. The organization they exhibit is internal. That is, it is embedded in the energy which they harbor. The self-determinacy they exhibit is the fact that their own internal condition determines what they will be, what quality they will show. Finally, as continuants, physical, living and spiritual beings, so far as perceptual, equally exhibit primary and secondary quality: extension, mass, size, shape, position, and color, scent, texture, sound, temperature, taste.

Within these common fundamentals, physical, living, and spiritual beings exhibit the differential characteristics which set them off: mere physicality, life, and spirit. I will describe these, first, by briefly comparing living with merely physical beings, then, by stating a list of characteristics peculiar to spiritual continuants.

A living being is a physical being richer in certain

major respects. First, as regards organization. The most simple physical things have sub-atomic structure, but the most simple living beings have at least super-molecular structure. Again, the parts of living beings seem to need certain specific connections to remain alive. A hand cut from an organism ceases to function as a live hand, and the organism itself may die. But a stone removed from a building does not lose its physicality, nor does the building. Living parts to remain living appear to require a more special complex of connections than physical parts merely to remain physical, seem to require. As regards behaviour, a living being, in contrast to a merely physical thing, exhibits so-called dynamical equilibrium. That is, a living being tends to keep the supply of its own internal energy at a fairly constant quantity, not merely to dissipate it as all physical beings including living beings do (entropy), but also to restore it. For instance, the animal body, so long as it is a living body, tends to keep at a fairly constant quantity, its nitrogen, carbon, sulphur, phosphorus, salt, glucose, and its temperature and alkalinity. In contrast to merely physical things, living beings also show other peculiarities of self-determinacy. For example, ascending the scale of living beings from dormant plant to higher animal, clear traces of feeling and consciousness appear, characterizing the activity of the living creature. These

seem to be wholly absent from beings merely physical.

In sum, then, living beings are physical beings variously richer in the structure and behaviour of their energy. As to spiritual beings, they are physico-vital energy-systems with peculiarities not found in beings merely physical, or merely alive. I will list four of these peculiarities.

The first is the ability to think critically, to make the items of the world objects of rational reflective examination, and to express the results of this examination in language and discourse. Man is the one animal known to have a documented history, a written science, and an articulated philosophy, propositions providing insights of intrinsic intellectual worth. Secondly, spiritual continuants have the ability to make the items of the world objects of contemplative enjoyment and felt appreciation, and to express the results of these activities in permanent forms. Man is the one animal known to have a recorded poetry and a self-conscious art, a body of creations intentionally symbolizing his experiences in external forms. Thirdly, spiritual continuants have the ability to treat their fellows, not merely as means, but also as ends, as beings guided by purposes of their own. Man is an animal who can self-consciously take roles, and act deliberately from the consideration of another's good, as well as his own. Finally, spiritual continuants have the ability to ac-

knowledge a supreme being, and to express this acknowledgment in meditation and socialized worship. Doubtless, spiritual continuants have other marks. For instance, man can make tools and build complex social systems. But such marks have definite parallels among beings who have not the four characteristics above listed: *e.g.*, insects, and higher animals. As spirit, or, in the degree in which he is spiritual, man is distinctively a free enquirer, an ethical and religious agent, and a fine artist.

The range or denotation of the term continuant, then, is representable by a triadic hierarchy: physical, living, spiritual beings. Our interpretation stresses two points. First, the differences between the members of this hierarchy are differences of richness. A living being is a physical system obeying the true physical laws, but more. A spiritual being is a physico-vital system obeying the true physical and biological laws, but more. Physical and biological laws are limited generalities. The more has been described in part. Second, the differences between the members of the hierarchy are differences within certain common fundamentals. They fall within and not outside a common ground. Broadly stated, they are differences of energy properties. Thus, spirit. As here understood, spirit is merely a complex property of continuant energy. When continuant energy is organized and consciously self-

guidant by such aims as just enumerated, it exhibits a peculiar type of definiteness. And this definiteness is spirit. Spirit is not a substance divorced from the continuant energy, floating on its own. Similarly, life. Life is merely a name for a distinctive type of complex definiteness present in and characterizing continuant energy systems. It is not a separate thing, an entelechy or psychoid.

These points will receive some attention in our sixth chapter, where the relations between matter and life, mind and body, are discussed. In the meantime, they indicate the standpoint from which the basic diversities between continuants are to be viewed. Recognition of such diversities is required, I believe, by the spread of empirical fact, and reductive monisms, materialistic and idealistic, fail, I think, because they would vainly level away the diversities, instead of resolutely working within the concrete multiplicity of such fact.

I pass now from the continuant differences to the common fundamentals in which these differences are absorbed. After denotation, connotation. Denotation indicates roughly the range of reality comprehended by the continuant principle, its empirical scope. Connotation will indicate precisely how this principle comprehends this fact. Since the truth of a theory depends largely on the adequacy of its grip, the analysis, clarifi-

cation, and verification of the common continuant fundamentals must occupy us most.

The common continuant fundamentals were stated above, very briefly. They sum up to this. All continuants are energy systems in process, exhibiting quality and internal organization, spatio-temporality and self-determinacy. Later chapters will deal with some of these fundamentals. Process is discussed in our second chapter, space and time in our fourth chapter, self-determinacy in our sixth chapter. There remain energy, quality, and internal organization. Stated in traditional terms, the problems these raise are the problems of substance, of quality, and of individuality. The three subsequent sections of this chapter deal with these three problems.

2. *Substance.*

Doubtless, the simplest analysis of the continuant is the classic expedient, matter and form.[2] The matter is the material, or stuff, of which the continuant is composed: iron in a pipe; nitrogen, oxygen, and so on in a volume of air; *etc.* The form is the organization embedded in this stuff, or material.

This analysis is rough, and open to misunderstandings. Let me try at once to remove the more elementary of the misunderstandings.

[2] George Santayana, *Realm of Matter,* p. 86.

First, regarding the matter. The matter intended is not the *materia prima* of philosophic tradition. *Materia prima* is a formless, qualityless stuff, "avowedly something incapable of existence." [3] In contrast, the matter intended here has both quality and form, and is very much in existence. For instance, the iron in the pipe has all the qualities of iron, the form of a pipe, and as fingers testify, very tangible existence. In the next place, the matter here intended is not the dead matter of reductive naturalism. Some matter is dead. But the living flesh of the animal, *qua* living, the spiritualized flesh of the saint, *qua* spiritualized, equally illustrate matter as here understood. Matter is variously qualited, besides formed. Finally, the matter here intended is not continuant quality, nor continuant form. It is not continuant form, as we shall see. Nor is it continuant quality. This would resolve the continuant into form and quality, and, since matter as quality would have to qualify something and nothing would exist in the continuant to be qualified except the form, matter would be a quality of the form. But if the iron were a mere quality of the pipe-form, then, should the pipe-form cease completely, the iron should cease completely, being merely a modification of the form. This is not the case. A blast furnace completely melts away the pipe-form, but the iron continues with

[3] George Santayana, *Op. Cit.,* p. 18.

a new form. Not being *materia prima,* matter as here understood, does exhibit quality and form, but it is not just one of these. Precisely, matter is the whole continuant energy-system qualitied and formed, taken in distinction from one of its aspects, the form.

As regards the form, it is, in the first place, not logical form as conventionally interpreted. Logical form conventionally interpreted is abstract and universal. But the form here meant is concrete and particular. It is embedded in the material of which it is the form, so concrete, and it is the localized structure in this material, its particular organization, so not universal. Nor is the continuant form here intended a general law governing the continuant's career. Such laws presuppose a formed entity already there to obey them. Moreover, these laws are manifest only over a span of time, whilst the continuant form here meant is manifest not only through time, but at any given time. In the next place, continuant form is not the perceptible outsides of *materia prima,* its outer style of being, nor is it the total qualities of a thing, as sometimes held. The first point follows from our denial of *materia prima,* the second from a distinction between form and quality made explicit in the next section. Finally, continuant form as understood here is not the shape of a thing, its outline. Shape is external, continuant form internal. Shape exists around the material, continuant form

through the material. Thus, a snowball has contour and solid togetherness of parts. Continuant form as here understood is the solid togetherness of the parts. The solid togetherness is the connexion of the material from boundary to boundary, and along the boundary, and is internal to it. The shape of the snowball is merely the linear contour around the material thus connected in continuant form.

Matter, then, is the whole continuant energy. Form is the internal organization of this energy. Qualities are properties exhibited by this energy as internally organized.

These points give to the classic matter-form analysis some of the refinements which our own view of the continuant requires. But more are needed. Thus, some recognition of logical form and universality in the continuant's being, is certainly requisite (Chapter III). But a more pressing need, I think, is a more complete adaptation of the matter-form analysis to time. So far, the continuant has been viewed only as it is at a given time. But the continuant continues, it exists through time. And since this continuance is on our view fundamental, extension of the matter-form analysis to the continuant as continuing is a necessary part of an initially correct view of it.

In making this extension, past philosophers wrote one of the strangest passages in the history of Western

thought, pinning on the term substance a stigma from which it is well nigh impossible now to free it. Their observation was attracted to the common fact that things through time often change quality and form without changing material. Thus, a stick exposed to rain becomes soggy and warped. Yet it remains wood. A classic example in this connection, is René Descartes's piece of wax.[4] As it comes from the bee-hive, the wax has a certain scent, color, size, taste, hardness, and shape. Placed near a fire, the wax loses its scent, hardness, and taste, and suffers a change of size, color, and shape. Yet it is the same material, wax: no one doubts that. On the basis of such observations, the conception arose that the thing through time is a permanent material concealed behind a cluster of momentary transient predicates which sense-experience discloses. The transient predicates were called accidents, the unchanging material under them, their substrate, was called substance.

This conception was held by Greeks, such as Anaximander, and Plato.[5] Aristotle sponsored it. Substance, he wrote, is "the ultimate substratum," the "something which underlies the changes" in a thing.[6] In modern

[4] *Meditation Two.*

[5] W. T. Stace, *Philosophy of Hegel,* p. 197.

[6] *Metaphysics,* Delta, V, Chap. 8; H, VIII, Chap. 1. In other passages, Aristotle conceives substance as the individual, as qualitied formed material. In conceiving substance as substratum, Aristotle apparently was seeking a basis for explanation of change, whilst Descartes, at least so far

times, it occurs in the monism of Spinoza, and the monadism of Leibniz. And it is most candidly stated in the temporizing dualism of John Locke. Consider, for example, Locke's view of the physical thing. According to Locke, a physical thing consists mainly of primary and secondary qualities, and a sub-surface material never exposed to view. This substrate, according to Locke, may be said to support the qualities, although not in any plain sense of the term support. Indeed, the substrate may be said to be necessarily connected with the qualities, although we cannot be said to know any necessary connection between the substrate and any one important physical quality, otherwise we could predict with complete certainty every occasion of experience of this physical quality, which, however, physical science in no instance is able to do. An empiricist in bent with some rationalistic background, Locke tried honestly to state the traditional substance theory of things without shutting his eye to empirical evidence. In consequence, Locke was forced to hold, in summing up his general view of substance, that it is like the support of the tortoise who supports the elephant who, according to the Indian, supports the globe: a something I-know-not-what.[7]

as the wax goes, was seeking to show that natural knowledge is rationalistic, and non-sensuous. These differences represent characteristic divergences in the two philosophers' interests, but are irrelevant to our account.

[7] Locke, *Essay Concerning Human Understanding*, Bk. II, Chap. XXIII.

Thus exposed, the traditional substance theory of the continuant through time, revealed its own inadequacy. Locke's British successors merely had to take Locke at his word. Berkeley found a support which did not support in any plain sense of this term, unintelligible, a mere abstract idea. In addition, he pointed out that, if this substrate is not known to necessitate any important physical quality, as Locke admits, we do not need to assume the substrate in any important explanation of physical qualities. Finally, Berkeley pointed out that nothing is added to our knowledge of things by adding to them an I-know-not-what. Thus, Locke's first important British successor, assuming Locke to have meant what he had said, showed material substance to be unintelligible, superfluous, and useless.[8] Nor was it difficult for Hume, Berkeley's successor, to attain similar results in regard to Locke's spiritual substance. Hume completed the criticism of the traditional substance theory by showing that, if substance is what Locke had said, then, far from representing objective fact, it represents merely a subjective fiction. Hume's continental successor, Kant, did not differ greatly from Hume on general points. Kant interpreted substance in the critical manner, as a form of the understanding woven into things by the activity of the creative imagination.

[8] *Principles of Human Knowledge,* Sects. 16-22, *passim.*

To summarize: the traditional matter-form analysis, extended to the thing through time, proved a victim of its own dialectic. Originally, substance as substratum was conceived as the basic objective element of the thing through time. But once candidly and critically exposed, substance as substratum showed itself to be a mere subjective fiction, a free invention of the imagination, the opposite of what it claimed it was.

Still, the traditional matter-form temporal analysis of the continuant aimed, I think, to preserve a valuable insight. This is that the things of common sensory experience, buildings, trees, furniture, persons, embody only temporary forms of a material which long outlasts them. This insight is the impetus to the age-old search in science for simpler elements, a search most fruitful, particularly in physics and chemistry. The basic mistake of the philosophical tradition was to conceive this permanent material as *materia prima,* a substrate concealed behind and independent of all quality and form. This is to analyze ordinary empirical things in terms of an element for which there is and can be not the slightest empirical warrant, and for which, as we shall see, there is no rational necessity, so far as the problem of describing the thing's permanence and its career through time goes. Such analysis justly generated the honest perplexities of Locke, and the conclusions of Berkeley, Hume, and

Kant. The scientific tradition, at least in modern times, did not make this blunder. As conceived by science, the permanent material was always definite, qualitied, formed material: molecules and atoms, electrons and protons, the ninety-two chemical elements.

Since we have accepted the matter-form analysis, a substitute for the traditional temporal extension of it must be devised. This substitute must allow for the insight which the traditional extension aimed to preserve. But clearly it must give up *materia prima,* and equally clearly, it must be in terms of formed qualitied material.

Let me introduce a few preliminaries. I will define a historic route as the temporal path of a continuant. A continuant will then be defined as a configuration of qualitied material in process of occupying a historic route. This definition is in conformity with our view that a thing really has a temporal dimension. Incidentally, such a view was never held in all seriousness by the substance tradition. Nor is it particularly prominent in uncritical thought. Asked what a thing is, the plain man will answer, if at all, by pointing to an entity here and now, such as a table. A thing is a three dimensional object fully revealed in the present. Similarly, in conceiving things as substances, as unchanging substrata, philosophic tradition conceived them as essentially all given in the present: *tout est*

donné (Bergson). On our view, to speak somewhat inaccurately, a thing never is, it only becomes. More precisely, a thing occupies a route, not merely a moment. And what is given at a moment is not the real thing, but an arrested cross-section of what the thing really is.

In light of these preliminaries, I propose to extend temporally the matter-form analysis, by substituting for the substance principle the principle of literal inheritance along a historic route. The principle amounts to this. Arrest a continuant configuration at any moment of its temporal career. It will exhibit an inheritance of qualitied formed material from its immediate past. And this inheritance, not any concealed substratum, is the principle whereby this thing is the permanence it is, the strand of stability it shows itself to be, amid flux. The inheritance, let me add, is never one hundred percent. At the least, the material ages in transmission, acquiring novel temporal quality. Moreover, as our recognition of the primacy of relation should suggest, no thing is a thing in itself, that is, shielded completely from transeunt influences. Hence, all sorts of novelty will enter even the deadest route. The paramount immediate point, however, is that, as a matter of fact, things in time do involve inheritance; at every temporal point there is derivation from the immediate past. And precisely this open derivation

from the immediate past, not any hidden substance, is the principle determining the thing to be the strand of permanence it is. It makes the thing the continuant thing it is through time.

As an illustration, I will cite a classic instance, an instance also which will be crucial, so far as our own and the substance theories go, namely, the instance of the mended sock. A sock comes from the factory whole (A), is worn through and mended, first at the toes, then at the heel, then at the arch and top, so that at a certain stage (X), no material which it had at A, remains. In such case, no fixed material substratum in the sock, remaining from start to finish below the surface shifts of the qualities throughout the sock's entire temporal career here, can be said to explain the permanence of the sock through time. The sock lasts. Yet the traditional substance principle simply does not apply. In contrast, our own principle, I think, completely applies. Examine the sock at any moment of its career (A-X). There is patent derivation of qualitied formed material from the immediate past. This transmission never ceases at any point along the route. Moreover, it is plainly this ceaseless carry-over from the immediate past which establishes the permanence pervading the route of the sock. This carry-over continuously gives the sock the material stability that makes it the lasting thing it is. Thus,

our own view fully applies. Substance fails on account of the hiatus between A and X. But inheritance from the immediate past weaves a connection between A and X. All along it continuously establishes material stability in the sock's temporal being. Given inheritance, the sock is the permanent thing it is through time.

Writers, whose general outlooks are different from ours, recognize the principle for which we contend here. George Santayana, the naturalist, with an eye on physical existence, writes: "continuity, for the naturalist, is merely a name for the fact that existence is a transmitted burden, something that goes on and is kept up." And in the same context, he points to the "hereditary nature of existence—each moment being *genitum non factum.*" "The matter of the earlier phase is inherited by the later." [9] Alfred North Whitehead, the idealist, with an eye on spiritual existence, writes: "consider our derivation from our immediate past of a quarter of a second ago. We are continuous with it, we are the same as it, prolonging its affective tone, enjoying its data. And yet we are modifying it, deflecting it, changing its purposes, altering its tone. . . . We are different from it, and yet we retain our individual identity with it. This is . . . the mystery of the immanence of the past in the present, the

[9] *Realm of Matter,* pp. 81, 82.

mystery of transience. All our science, all our explanations require concepts originating in this experience of derivation." [10]

The question of the last half of this section has been: what is the principle of permanence of the thing through time? Our answer: not substance, but inheritance. This has involved two additional points. First, a denial of *materia prima*. This enables the inheritance principle to escape the dialectic which destroyed the substance principle. Second, insistence on qualitied formed material. This enables the inheritance principle to apply to the empirical situation wherever it meets us, in ordinary experience as well as in the sciences. I have selected the instance of the mended sock, but obviously endless instances from either common experience or science might equally have been cited. I have cited this instance, because it seems to me to indicate clearly enough the general mode of application of the inheritance principle, and also because it shows this principle applying to an instance of permanence where the principle of a concealed material, enduring unchanged in a thing throughout its fluctuating career in time, plainly has no empirical application, supposing it ever to have had one.

A point concerning change before passing. On the substance principle, change is a surface phenomenon,

[10] *Adventures of Ideas*, pp. 209-10.

concerned merely with the reshuffling of the accidental qualities of things whose essential being always remains what it was. On the inheritance principle, as above interpreted, change is fundamental. In a world of things permanent in our sense, novelty in their essential being, in their formed material, is continual, since one hundred percent inheritance has been denied. This view of change as ubiquitously complementary to permanence, as equally involved in the essential being of things as permanent, is summed up in our theory by saying that change and permanence are equal first principles. In the next chapter, this point will be restated, amplified, and qualified in certain directions.

So far, the continuant has been described as an energy-system qualitied and formed. This section has noticed most the conservative energy-system. I will now discuss continuant quality, and form.

3. *Quality.*

The substance analysis of the continuant created the problem of how the qualities, conceived as accidentals, qualified the concealed substratum. How do the accidents inhere in the substance? This problem was usually found insoluble. Fortunately, our denial of substance allows us to be free of the riddle. Yet the question remains: in what manner do qualities belong to things? what is quality in the make-up of the thing?

In this section, I shall offer an answer to this general problem, and also to a second general problem about quality to be mentioned below.

What is continuant quality? To clear the ground, let me state what it is not.

In the first place, quality is not the matter of a thing. This follows from our position in the previous section, that matter is not a quality. In the second place, a quality is not a part. This can be shown to follow from our previous position, but I will show it independently. A quality can never be severed from the whole wherein it is manifested and exist by itself in independence. A part often can. A part may be ripped from a book, for instance, and exist separated from the book. But the shape or hardness of the book cannot be ripped off and set up in separate existence. In the third place, a quality is not a mere power, that is, a potentiality of the continuant matter. Some qualities are powers. But a large number of qualities, for instance, the mass, solidity and color of my table now, are not. They are actualities. Unlike powers properly so-called, they do not need the introduction of additional circumstances to be qualities in full actuality. Finally, quality is not the continuant form. Form has to do with the parts, it is the connection of the diverse parts. Quality has to do with the whole, it manifests the definite nature of the whole. Continuant form is a relation, a species

of our third *summum genus*, the material relation of the continuant parts. Continuant quality is a manifestation, a content of our first *summum genus*, manifesting the mode of being of the continuant energy as a structured whole.

To state this position more positively. As we have seen, continuant matter is not *materia prima*. It differs in three respects. First, it is commonly in full view. The glass I touch, the wood I see, are pieces of continuant matter. Second, this matter exists as formed. It is not merely *mannigfaltig*, formless. Its parts have connexion pervading them, they are a whole. Third, this formed whole exhibits its being in definite ways. It is light or heavy, large or small, hard or soft, massive, shaped, and solid. Here are the continuant qualities. A continuant quality, then, may be defined as a type of definiteness manifested through an occupied region of space-time. The formed matter occupies the region, and this matter is definite throughout: massive, colored, solid, and so on. Such types of definiteness manifesting the nature of the formed material in a region, are the continuant qualities.

This definition may be generalized. As generalized, the definition of quality is a type of definiteness manifesting the nature of any fact as a constituted fact. The fact may be much more than its qualities. As with the continuant, it may have parts and a struc-

ture of these parts, that is, a constitution of the extensive type. But if it is a constituted fact, it will have specific modes of defining the nature of its being as that constituted fact. It will have types of definiteness revealing the constitution already there. These will be its qualities. As we shall see later, many facts besides continuants do have qualities, for instance, all events. The generalized definition is intended to apply to all such cases.

I promised above to discuss a second general problem of quality. I will now state it. Continuant qualities may be said to fall into two groups. Some are non-universal, that is, not shared by all continuants, *e.g.*, spirit. Some are universal, apparently shared by all continuants: *e.g.*, mass and color. The problem I wish to discuss concerns these universal qualities. Usually, these qualities are also divided into two groups: the primary, and the secondary. Mass illustrates the primary, color the secondary. The problem for discussion is: why this division into primary and secondary? Has it ultimate philosophical significance, as usually supposed?

In modern times, this division of qualities became prominent at the inception of exact modern science. Presumably, the dominant motive for making it was methodological. In its earliest modern form, exact natural science was old-fashioned mechanics, the

science of macroscopic motion. Now, in working out laws of macroscopic motion, some qualities of things are of primary importance, but some are not. Thus, in determining the laws of celestial motion, or of balls rolling down an inclined plane, it is not essential to reckon with the color, taste, or scent of the objects. Mass, size, position, and such qualities are alone of primary importance. Hence, these qualities may be called primary, and the others secondary, having importance only as aids in better determining the primary qualities.

Such a division of the continuant qualities is above reproach. But it was interpreted differently from the start. Presumably methodological, it was interpreted metaphysically. Presumably a division of qualities marking which are important and which not important for macroscopic mechanics, it was interpreted as a division of qualities into two types of ultimate realities. In Galileo,[11] in Descartes, in Locke, for example, the primary were conceived as objective, out there in things, independent of the percipient. The secondary were conceived as subjective, sensations in the percipient due to the action of the primary qualities upon the observer's sense-organs and consciousness. Color, for instance, was interpreted by John Locke as a

[11] E. A. Burtt, *The Metaphysical Foundations of Modern Science*, p. 73 *ff*.

sensation due to motions stimulating the eye, inducing changes which are conveyed over the nerves to the inner seat of consciousness. Likewise scent, taste, and the other secondary qualities. As to the thing itself, the thing external to the percipient consciousness, it was interpreted as a colorless, odorless, tasteless substance which somehow possessed, independent of the percipient, mass, position, shape, and the other primary qualities.

The result of this philosophical analysis was to bifurcate nature into two realms, external things and subjective sensation. The latter is immediate but private, the former is public but inferential. "One is the conjecture and the other is the dream." [12] In spite of the highly treacherous dualism thus involved, this theory of qualities became, and still is, the orthodox view of scientists and philosophers. The view has been challenged in the past: *e.g.*, Berkeley challenged it. The view is also being challenged to-day, notably by S. Alexander,[13] and by A. N. Whitehead.[14]

The position I wish to advocate is as follows. The

[12] A. N. Whitehead, *Concept of Nature*, p. 30.

[13] *Space, Time, Deity*, Vol. 2, pp. 138-143.

[14] *Concept of Nature*, p. 27 *ff*. Whitehead refuses "to countenance any theory of psychic additions to the object known in perception" (p. 29). "For us the red glow of the sunset should be as much part of nature as are the molecules and electric waves by which men of science would explain the phenomenon." (p. 29). "It seems an extremely unfortunate arrangement that we should perceive a lot of things that are not there." (p. 27).

immediate deliverance of perceptual experience is that the secondary are objective qualities, intrinsic to things in exactly the same sense as the primary. The major arguments employed to try to show that the secondary qualities are not rightly interpreted as objective, particularly that they are rightly interpreted as subjective, do not succeed. Hence, the immediate deliverance of experience on the question is without need of retraction, and, despite methodological merits, the orthodox division of qualities is unacceptable as an ultimate philosophical division, or, as a division into two types of realities.

I believe it will be admitted by all that the secondary qualities are immediately perceived as objective, not as subjective. When I perceive a square brown table, the brownness, no less than the square shape, is perceived as a quality of the table. When I taste the sweetness of an apple, it is not I who am perceived as sweet to my taste, but the apple. Brownness and sweetness, no less than squareness and roundness, are immediately perceived as if they were objective characteristics. Accordingly, I pass to the arguments employed to try to show that this deliverance of experience is wrong, that the secondary must be interpreted as subjective, the primary as objective: *e.g.*, that the brownness of the table must be held to be in me, whilst its square shape must be held to be in the table.

The major arguments for this position are, I believe, the following four.

The first invokes Occam's Razor: entities (assumptions) should not be multiplied beyond necessity. Physical science does not need to assume that colors, tastes, and so on, are objective characteristics. It can describe and predict physical fact without employing these items in its formulae, and it is not helped in the least when it tries to employ them there. If for physical description these items are nothing, the law of simplicity dictates that we suppose them to be nothing physical, or objective.

This argument has several answers, but perhaps the most effective is in terms of the simplicity principle itself. The argument asserts that a superior simplicity is gained by declaring the secondary qualities non-objective. This may be true for physics. It is not true for philosophical analysis. Making this declaration, the philosopher must then explain, first, how secondary qualities arise when percipients who cannot command them attend to objects which do not really have them (Locke described this as a miracle), and, what is worse, how secondary qualities, having somehow arisen and taken abode in the percipient subject, always appear as if they were out there in the perceived object, as intrinsic characteristics. Plausible explanations of these two circumstances may be possible, but they will not

be easy. And they will clearly give rise to a theory of secondary qualities much more complicated here than the simple view we accept, *viz.,* that the secondary qualities are objective characteristics which certain limited or special sciences find of minor significance for their special investigations.[15] If simplicity of theory is the great *desideratum,* as this first argument assumes, then, in philosophical analysis this appears to lie, so far as the situation described by the argument goes, in the assumption of the objectivity, or non-subjectivity of the secondary qualities.

The second argument is that the actual deliverances of physical science conflict with the view that the secondary qualities are literal properties of things. Hence, if a philosopher wishes to be scientific, and the insinuation is that he better, he must hold that color, taste, and the secondary qualities generally, are subjective, not objective.

On this point, I quote C. D. Broad: "It is sometimes thought that the physical theories of light and heat *disprove* the commonsense view that physical objects are literally coloured or hot. This is a sheer logical blunder. The physical theory of light *e.g.* asserts that,

[15] Secondary qualities, such as colors, are real aids in some physical investigations, for instance, spectroscopic analysis. In stating his formulae, however, the physicist does find it more convenient to substitute for such qualities what C. D. Broad calls "the hypothetical movements of the hypothetical parts of their permanent conditions." (*Scientific Thought,* p. 281.)

whenever we sense a red sensum, vibrations of a certain period are striking our retina. This does not prove that bodies which emit vibrations of that period are not literally red, for it might well be that only bodies which are literally red can emit just these vibrations. The vibrations (as they play on our sense organs) might simply be the means of stimulating us to sense the red colour, which is literally in the body." Plainly, the main point of this passage, the non-contradictoriness of the scientific and the commonsense theories here, might be extended to temperature, scent, taste, and sound, and the secondary qualities generally. In an earlier passage, Broad writes as follows about the bifurcationist theory: "When I look at a penny, the brown colour that I see is spread out over the round contour. . . . We are asked to believe (on the bifurcationist account) that there is brownness without shape 'in me,' and round shape without colour out there where the penny is, and yet that in some mysterious way, the shapeless brownness 'in me' is projected into the round contour of the penny 'out there.' If this is not nonsense, I do not know what nonsense is."[16]

A third and older argument is that each of the secondary qualities is inextricably bound up with a peculiar sense-organ, and hence, non-existent except in the presence of a percipient equipped with such an

[16] *Scientific Thought,* p. 280, italics in text; pp. 273-4; parentheses mine.

organ. Color depends on the eye; for the blind there is no color. Sound depends on the ear; for the deaf there is no sound. Unfortunately for the case of bifurcation, this argument can be extended to show equally well the non-objectivity of the primary qualities. Size, position, and figure, for example, are inextricably bound up with the organs of sight and touch, in the same sense as color is inextricably bound up with sight, or sound with hearing. For a person who has lost the senses of sight and touch, *e.g.*, a person knocked unconscious, things have no size, position, or figure.[17] If the bifurcationist holds that this relativity to percipient conditions proves that the secondary qualities are subjective, which, as we shall see in a moment, it does not, then, the primary qualities can equally be proved to be subjective, and bifurcation disproved.

This third argument is sometimes stated in terms of variability. A sound varies from percipient to percipient, depending on the distance of the percipient from the sound's origin, his attention and interest, his powers of tone discrimination, the medium, *etc.* Colors, scents, and so on, vary similarly. Since the secondary qualities therefore are functions of the percipient's varying conditions, they are properly described

[17] *Cf.* C. D. Broad, *Scientific Thought,* p. 164; A. N. Whitehead, *Concept of Nature,* p. 43.

as dependencies of percipients. Obviously, this second form of the argument has the same difficulty as the first form. As G. F. Stout observes: "Size, shape, . . . appear different under different conditions of perception, just as colours and sounds do."[18] Hence, if variability from percipient to percipient of colors and sounds means subjectivity, then, size and shape and the other primary qualities, which vary similarly, are also subjective.[19]

The fact is that the relativity and variability on which this third argument is based, are not grounds for declaring subjective anything at all *prima facie* objective, secondary or primary qualities. This relativity and variability can be taken care of quite satisfactorily by the commonsense theory of perception, without alteration at all of the status of the *prima facie* objective. This commonsense theory is that an act of perception is an act of discrimination, it is discriminating and distinguishing, among other things, the features of objects, not creating them. And "if an act of perceiving be, in fact, an act of discriminating and distinguishing the features of an object, that the object should appear differently according as its features are less or more

[18] *Mind and Matter,* p. 272.

[19] Locke argued that primary qualities are inseparable from and invariable with body. Berkeley's great contribution here was his proof, not that the primary qualities are subjective, but that, so far as invariability and inseparability go, primary and secondary qualities are in the same boat.

accurately discerned is by no means inexplicable."[20] If a person has a power of vision handicapped variously, *e.g.*, by great distance from the object, by color-blindness, by inattention, he will naturally discriminate the visual qualities of things, such as colors, differently from a person of visual powers not so handicapped. And if a person has no visual power at all, he will naturally not discriminate at all the visual qualities, such as colors. For him, they will be non-existent. Thus, the relativity and variability on which this third argument is based, are exactly what one would expect if the primary and secondary qualities were objective, and perception were discrimination, as the common-sense theory asserts. The hypothesis of subjectivity is entirely superfluous.

A fourth argument is that the primary qualities are capable of exact quantitative determination, the secondary not. Hence, although relative and variable in ordinary perception, the primary can be made objective, or the same for all, in scientific apprehension. Their subjectivity can be eliminated, whilst the subjectivity of the secondary cannot.

This argument shifts the ground a bit, defining objectivity as 'same for all.' But, even on this ground, the proposed bifurcation of continuant qualities is untenable. This is clear, once one asks how the so-called

[20] G. D. Hicks, *Berkeley*, p. 125.

objective shape, size, mass, and position of objects are determined. The method is to adopt antecedently a set of conventions, including a standard measure, then apply these. Consider shape. The so-called objective shape of a surface is determined by taking a geometric form, which is accepted as standard, and superimposing it upon the surface. If the two upon comparison fulfil the requirements of congruence, the shape of the surface, *e.g.* the so-called objective shape of a penny, is then said to be the shape of the standard, *e.g.*, circular. Now, this sort of exact determination is equally possible with the secondary. Consider color. A patch of color, taken under specified illumination and similar fixed conditions, may be labelled standard light-red. The objective color of a body can then be determined, by comparing the body's color with the standard color under the specified conditions. If the two fulfil the requirements of matching under these conditions, the color of the body, its so-called objective color, may then be put down as light-red.

In general, a standard color-scale, such as psychologists devise, presents no greater theoretical difficulties than a standard shape-scale. Moreover, standard colors can be assigned numerical correlates, as they are in physics. And it is a fact that temperatures and tones are capable of correlation with standard metric scales. If this sort of standardization means objectivity, then

color and temperature and tone are as objective as shape and size and mass. They can be made the same for all who can antecedently accept and then fulfil a set of stipulated conditions.

To conclude: the four major arguments for the traditional bifurcation of the universal continuant qualities, do not carry. Appeals to simplicity, to science, to perception, and to the possibility of standardization, do not support a division of these qualities into two types of reality, subjective and objective. The immediate deliverance of perceptual experience that the secondary are objective qualities of things in the same sense as the primary, is, therefore, without need of retraction. And the division of continuant qualities into primary and secondary, although it has considerable methodological importance, has not the ultimate philosophical significance commonly attached to it.

4. *Individuality.*

Although possessing manifold qualities and diverse material parts, continuants are unities. A star, a plant, a human being, is one, and counts for one. It has numerical individuality. To be sure, no continuant is an individual merely numerically. As wholes of parts, continuants have natures, articulated by self-determinacy, manifested through quality. Each is an individual qualitatively, not merely quantitatively. In

addition, as our recognition of transeunt relationality suggests, a continuant is not a thing in itself, an isolated unit. In being the unit it is, a continuant is united in various ways with other reals. Individuality exists within relationality, not outside it. But these points will be noticed and emphasized later. In this section, I wish to discuss merely numerical individuality. Now, it is clear that continuants do have individuality of this sort. That is, each is not a mere numerical manyness, a mere qualitative material diversity, a *mannigfaltiges*. Each is numerically one. What is the principle securing this oneness, this numerical individuality? What makes a star, a plant, a human being one, not merely a manyness?

Various answers have been given. Some say a thing is one because its parts are enclosed in an unbroken spatial contour. This view has difficulties. Siamese twins, for instance, show unbroken spatial contour, yet are usually considered numerically two persons, not one. A second theory is that a thing is one because it can be taken as embodying one purpose. Each Siamese twin is one because each is animated by its own individual purpose. This theory also has difficulties. An object embodying many purposes is often taken as one. The object now on my table serving as an inkwell, paperweight, and illustration, now embodies three pur-

poses, yet would be called one object. Besides, objects are often taken as one, independent of any purpose they embody. A stone found in a forest often would be called one stone, without considering its purpose in the forest, or in general. This position, of course, does not mean that such things as stones do not embody purpose. All continuants embody at least self-determinacy. But self-determinacy and purposiveness in other senses are, I think, dependent upon a thing already being a whole with a pervading nature to manifest. And a whole so composed is plainly something already recognizable as numerically a unit.

On second glance, the question of this section is, I think, two questions. First, what is the principle securing individuality at a moment? What makes a stone one thing at a given moment? Second, what is the principle securing individuality through time? What makes a stone here yesterday and still here numerically one stone?

The answer to the first question is, I think, organization, or form. "The form serves to characterize each moment and give it individuality and limits."[21] At a given moment, a thing is a configuration of qualitative material with form, or inner connectivity. This connectivity secures a configured unity. Hence, at a moment a thing is not a mere manyness of qualities

[21] Santayana, *Realm of Matter,* pp. 86-7.

and parts, but a unified manyness, or, numerically one. Incidentally, connectivity also enables a thing to embody whatever purposiveness it does, particularly self-determinacy. Form secures the wholeness which is antecedently required for any display of pervading self-character.[22]

The second question is: what principle secures numerical individuality over time? What makes the stone here yesterday in this building and still here numerically one stone? The answer is, I think, inheritance. A thing occupies a route of inheritance. The stone of to-day belongs to a temporal route occupied by the stone of yesterday, a route over which there has been inheritance of formed material by the present stone from inheriting ancestors stretching back to the stone of yesterday. This inheritance connects the two, and makes the two stones, not two, but one. Suppose, for example, the stone of yesterday were dislodged and replaced between yesterday and this moment by another stone. A person would declare the stone of yesterday and the stone now in the building two stones, not one. The sole difference in the situations, however, is that, in the second situation, the present stone does not inherit from the inheriting ancestors of the stone of yesterday, but from inheriting ancestors of

[22] That connectivity may be of different types, or, that individuality may be of different types, organic, *etc.*, is of course not at all disputed. See section 1, above.

a co-existent of the stone of yesterday. In other words, it inherits on a separate temporal route.

Form, then, unites the continuant manifold, sets it off, and secures numerical oneness in a thing at a moment. Inheritance secures numerical oneness in a thing through temporally separated moments. When a thing at one moment and a thing at another moment are commonly declared to be numerically one, inheritance of formed material by way of ancestors, will be found connecting the thing at the second moment and the thing at the first.

Broadly speaking, this discussion has assumed throughout the ordinary view of the thing. Ordinary thought tends to consider a thing as if it were wholly existent at a moment. In viewing a thing at a given moment and a thing at another moment as numerically one, however, the ordinary view implicitly recognizes the continuant interpretation, which holds that a thing occupies a route, not a moment. In addition, the ordinary view as above presented suggests the principle of numerical oneness here congruent with the continuant interpretation, namely, the inheritance principle. Where you are said to have one strand, or, to put it differently, two temporally separated sections which are said to be one, you will find inheritance of formed material from the immediate past all along the strand and connecting the two sections.

Such cases of oneness are cases of inheritance. Similarly, where it is commonly and clearly recognized that there are what we would call two different strands, either simultaneous or successive, the inheritance between the two will be found to be either non-existent, or, considered so unimportant in comparison with the lack of inheritance, that it plainly has been without weight in the making of the reckoning. This determination of numerical plurality by discontinuity or lack of inheritance, of course, is negative testimony that inheritance is the principle of numerical oneness. In summing up, therefore, we may say, that the numerical individuality of continuants, certainly where it is recognized as clearly existing, will be found to be based on the central principle of continuant permanence, that is to say, on the constant salvaging of the immediate material past by the present at the influx of the future.

CHAPTER II

Events

1. *Change.*

In a world of things, such as we have described, formed material is being continually inherited. Things are configured materials in process, forward going, advancing as strands. Accordingly, where there is material, there is process; where there are things, there are events. Events are as ubiquitous as continuants.

An event, as understood here, is a transition, a forward going, or a going-on. The on-going of a quiescent stone over a quarter of a second, is a tame event; the passage of a dynamited stone from a formed whole to myriad fragments, is a wild one. Events embody the "forward tension" [1] in the universe, the passage, as continuants embody the conservation, the permanence. Events unfold the continuant material, establishing routes of stability. But they are the flux in which the strands are formed, the passing, not the stable material which lasts.

Some use the term event to denote the formed ma-

[1] George Santayana, *Realm of Matter,* p. 91.

terial which continues.[2] Some call qualities events.[3] My table and its brown color, for example, are events. Such usage is not followed here. The table is a continuant, its brown color a quality of a continuant. Only the forward going of the table and its quality to whatever fate awaits them, is an event in our sense.

Events are sometimes said to be of two types. Some are transitions to relative novelty; *e.g.*, the disruption of the dynamited stone. These are called changes. Some are transitions to relative sameness; *e.g.*, the forward going of the quiescent stone over a quarter of a second. These are called persistences, or endurances. Minds change, mountains endure. This classification is imperfect. In a sense, every persistence is a change, every change an endurance. The outcome of every persistence is different from its starting-point, at least in temporal quality. Every persistence is a transition at least to temporal novelty. Conversely, every change is a persistence. The outcome of every change is only relatively novel, as we shall see. Something old endures.

Accordingly, instead of saying that events are either changes, or endurances, it seems preferable to say that

[2] C. D. Broad, *Scientific Thought*, p. 54: "By an *event* I am going to mean anything that endures at all, no matter how long it lasts or whether it is qualitatively alike or qualitatively different at adjacent stages of its history." Italics in text.

[3] N. K. Smith, *Idealist Theory of Knowledge*, p. 10.

events are both changes and endurances. In the pre vious chapter, discussing things, somewhat extende notice was taken of endurance, called inheritance. I this chapter, I will discuss change. This sectio will give a general characterization of a change and determine the status of change as a reality The other sections will discuss other problems o events as changes, including the problems of evolu tion.

A change is a transition to novelty. This characteri zation will receive most notice in this discussion. Bu other general characterizations are possible. I cite two First, a change is a transition from indefiniteness t definiteness.[4] Prior to a change, its novel terminus i indefinite, lying in the future. After the change, th novelty is definite. The uncertainty of the future ha been displaced by the definiteness of the past. Second a change is a perishing and a generating. At the ter minus of a change, the old in certain respects ha ceased to be. There has been a loss, a perishing. Ye novelty has appeared. There has been a gain, a genera tion. A change involves a coming into being and going out of being, being and non-being.[5] This i Plato's description of everyday occurrences, and Hegel' account of becoming.

[4] E. W. Hall, *Time and Causality, Philosophical Review,* 1934, p. 34

[5] R. Demos, *Non-Being, Journal of Philosophy,* Feb. 1933.

But a change is always a transition to novelty. The novelty is of various sorts. The most familiar is qualitative novelty, novelty of color, size, position, of quality generally. Transition to qualitative novelty is change in the ordinary sense of the word.[6] But novelty is of other types. First, there is relational novelty, novelty of connexion acquired by reals in the course of events. Second, there is material novelty, the manifold novelty involved in formed material entering, or leaving, a route. Third, there are novel events. Changes lead to changes (causality), and each change has its own character, place and date. No individual change ever actually happens twice.

This rough classification raises many questions. The more general of these, which have not been discussed, can be dealt with most conveniently in connection with evolution and teleology, relation and causality. But a most general question may be disposed of at once. The reader may ask: but why is there transition at all? why change? how account for their existence? This question is not: why this specific interaction, this specific transition, this novel sequence of events? The existence of specific changes and novel sequences of all sorts is taken care of by the causal principle, as we shall see. The question here is more general: why

[6] C. D. Broad, *Scientific Thought,* p. 91.

change at all? why transition at all? what is the origin of their existence?

This question, I think, cannot be answered, but a significant remark can be made about it. This is that the question needs no answer. It is, from our standpoint, a meaningless question. On our view, change is a first principle. Now, first principles are the ultimates of the real. That is, they are the top-principles, there is nothing beyond them from which to derive them. And it is meaningless to assume, as does this question, that there is. Doubtless, one may legitimately question, as some have, whether change is a first principle, or even real. This will be discussed in a moment. But if one does hold that change is a *summum genus,* as we do, change is underivative. It is a final principle. Hence, to ask that change be derived from something else is, so far as we are concerned, a pointless request.

As I have said, however, one may question legitimately, whether change is a first principle, or even real. Since Parmenides and Zeno, this has been done. And idealists attempt it to-day. The history of the discussion need not detain us, but it is profitable to face the general issue as it exists at the present time. I propose, therefore, to discuss the argument against the reality of change stated in recent idealist literature. This argument is, I think, as strong as any offered for

the general position in question.[7] And it offers an excellent opportunity for seeing more closely the status of change as a reality.

The argument may be paraphrased as follows. Change is a property of something said to change. If nothing can be said to change, there is no change.[8] This is self-evident. Can anything, then, be said to change? Let A be anything. And let us say, A changes. Now, when it is said that A changes, is it meant that the whole of A, A over the whole route, or all A ever really is, changes? Surely, not this. In any case, A in this sense cannot be said to change. For anything can change, if at all, only if there is something new which it can really be. But A in the present sense is by definition all it ever can really be. There is no novelty really open to it in the present sense. Hence, no real change is possible to A here. Accordingly, when it is said that A changes, what must be meant is that some part of the whole of A, or some quality, or some relation of it, changes. Let us call

[7] Current writings abound with discussions of Zeno's Paradoxes, but these Paradoxes concern only one type of change, motion or change of spatial position. The idealistic argument is more comprehensive, including all types. On Zeno's Paradoxes, see: B. Russell, *Our Knowledge of the External World,* (Amer. Ed.), p. 167 *ff.;* C. D. Broad, *Note on Achilles and The Tortoise, Mind,* N.S., Vol. XXII, p. 318 *ff.;* R. B. Perry, *Present Philosophical Tendencies,* pp. 104-5, p. 250 *ff.;* H. Bergson, *Creative Evolution,* (Eng. Trans.), pp. 308-313.

[8] F. H. Bradley, *Appearance and Reality,* Eighth Impression, p. 45 *ff.*

this part, quality, or relation, T. Then, when it is said that A changes, what really is meant is that T changes. Still, is it meant that the whole of T, all T ever really is, changes? Surely, again, this cannot be meant. In any case, T, as all it ever really is, cannot be said to change, for the same reason that A, as all it ever really is, cannot be said to change. There is no real novelty open to T in this sense.

Obviously, we are caught here in an infinite process. In the search for something that changes, we might go to a part, quality, or relation of T, such as M. But M would fail us, as did T, and for the same reason. And if we went to a part, quality, or relation of M, such as Z, this would fail us also, for the same reason. Pursue the matter from the beginning as far as you like, you will never find either any thing possessing the character of changing, or any part, quality, relation of your original thing possessing it, or any part, quality, relation of this part, quality, relation, possessing it, *ad infinitum*. But change, if anything, is a property of something that can be said to change. Such a something cannot be found. Hence, change is appearance. There is no such reality as change.

Such, stated in our own terms, is the idealist argument against change. And the argument is perfectly valid, I think, within its assumption. But this assumption is not valid. The argument assumes that change,

if anything real, is a property of something which has completed its route of being, some finished whole. It searches for such a something possessing the property of change, and, not finding it, declares change not to be real. This assumption is mistaken. Change is not correctly viewed as a property. Certainly, change is not correctly viewed as a property of any thing which has completed its route of being. Change pre-conditions relatively complete routes, weaving them into existence. But it is entirely warrantless to assume that change then resides as an attribute in a thing with whose being change has already finished. The idealist argument looks for the baby in the bath, when the bath is over and the baby dressed. And it fails because it rests upon such an unwarranted, not to say absent-minded, procedure.

Within its assumption, however, the argument is perfectly valid. Accordingly, the idealist effort may be taken as showing, not that change is not real, but that change is not viewed as it really is when it is taken as a property of something which has completed its route of being; *e.g.* Bradley's Absolute. This raises acutely the question of how to view change as it really is. What sort of fact is a change? The view I urge is that a change is exactly the same general sort of fact as a continuant. More precisely, a change is something which possesses qualities, or properties, and

stands in relations, but it is not itself a mere property, or a mere relation.

This view is based on the following considerations. First, change is a fact. This is admitted even by those who declare change appearance, not reality.[9] Second, a change is not a quality, or property. A change is not a property of a thing which has completed its route of being. The idealist argument shows this. Nor is a change a property of a thing in process of completing its route of being, A not fully A. In such a situation, what you have is process modifying material, or, process bringing novelty into the material. That is, the process stands to the material, not as a property to a substantive, but as cause to a patient. The process is the cause, the material is suffering modification at the hands of the cause, and the effect is the new state of the material. Third, a change is not a relation. A change is not a structure in which things stand, but the movement by which things pass, as they may, from one state of structure to another, or by which structures themselves arise and pass from one state to a next. Finally, a change possesses qualities or properties, and stands in relations; *e.g.*, every change has temporal quality, and stands in temporal relations to other changes, and to other fact.

A change, then, is a something which possesses qual-

[9] F. H. Bradley, *Appearance and Reality*, p. 206.

ities, and stands in relations, but it is not itself a mere quality, or a mere relation. Sometimes, the name given to such a something is substance.[10] In our first chapter, however, substance was used to stand for the concealed substratum supposed to be in things, the unqualitied X which is all indefiniteness. Not to confuse matters, I shall use a different term to denote the something here, which is thoroughly unconcealed, qualitied, and definite. The term is substantive. And on the view here, an event is a substantive.

The substantival view of events [11] is the answer to the idealist argument. This argument assumes the adjectival view normal in uncritical thought. And the argument proves at most that if you view change in this uncritical adjectival way, you will not find change to be real as you supposed. A change is not real as an adjective. The substantival view accepts this argument, and describes change differently. Assume that a change is a substantive, it replies; you will then find change to be as real as you had supposed. Not only does the subtantival view, answering the idealist, se-

[10] J. E. McTaggart, *Nature of Existence,* Vol. 1. This usage presumably derives from those passages in Aristotle where substance is used to denote, not the substratum, but the individual. My articles, *Nature of Change, Monist,* July 1930, and *Change Is Substance, Monist,* April 1931, follow McTaggart, applying the term substance defined as substantive is defined in the present text.

[11] A. N. Whitehead, *Concept of Nature,* p. 19, writes: "If we are to look for substance anywhere, I should find it in events, which are in some sense the ultimate substance of nature."

cure reality to events. In putting events under the same type as continuants, which are substantives, it coordinates one principle with the other, or puts the two on a par, and it describes the status of the event as a real. This, it says, is what the event really is. This status is additionally described by our earlier assertion that change, or the event, is, as the continuant, a first principle.

This latter position, it is understood, rests not merely on the above argument, but on the evidence, the argument and verification of our entire work. Its various difficulties cannot all be met at once, but must be met at various places. Thus, such difficulties as the relation of God to events, will be considered later. In the meantime, perhaps one technical difficulty should be disposed of. The reader may be puzzled by our insistence that the event and the continuant are substantives, yet first principles. Are not first principles *summa genera,* the inclusive principles? But if the substantive includes the event and the continuant, are the event and the continuant *summa genera?* Is not the substantive the *summum genus?* The answer is that this objection is technically correct, but actually of no consequence. *Summa genera* are those principles in terms of which all the diversity in the real can be denoted and expressed. Now, the event and the continuant principles do denote and express all the sub-

stantival diversity in the real, as we shall see. Hence, although the substantive principle may be said to be a higher classificatory cell than either the event or the continuant principle, these two, in exhausting the content covered by the substantive principle, may be substituted with complete impunity at the top in place of this principle. As a matter of taste and suggestiveness, I have preferred to make this substitution.

In this section, a general characterization of change has been given, and the status of the event as a reality described. The relation of the event to the continuant has also been discussed briefly. This relation needs more extensive clarification to set before the reader properly our version of the substantival view of events, and I propose now to discuss this relation at some length.

2. *Relativity.*

Where there are things, I have said, there are events. Events are as ubiquitous as continuants. I wish now to call attention, first, to the converse of this. Namely, where there are events, there are things; where there is change, there is persistence.[12] This relativity of change to persistence, has been called the Paradox of

[12] W. E. Johnson, *Logic,* Part III, p. 83: "we can only speak of change or alteration by conceiving of an existent which continues to exist within both the periods of time to which the change refers."

Change.[13] Yet it is both rationally intelligible, and empirically plain.

In the first place, it is empirically plain. The reader can see this most easily by attempting to point to a change in his experience which has involved absolutely no continuance. Two general seeming exceptions, however, require discussion. First, the events of so-called empty space. Here are events, yet are there things? In so-called empty space, it is true, there are no gross things. Yet there are continuants. A. N. Whitehead writes: "something is always going on everywhere, even in so-called empty space. This conclusion is in accord with modern physical science which presupposes the play of an electromagnetic field throughout space and time."[14] In other words, so-called empty space is pervaded by an electromagnetic field. And such a field is an energy-system, enduring with transformations through time, a continuant. The second seeming exception is the mystical experience, Bergson's headlong plunge into the flux. Here things seem to become all molten; we seem to reach pure movement. Still, there is the mystic himself, the human being, a continuant. He exists through the mystical experience, surviving to tell the tale. Bergson writes: "There are changes, but there are no changing

[13] A. E. Taylor, *Elements of Metaphysics*, p. 159.
[14] A. N. Whitehead, *Concept of Nature*, p. 78.

things." True, if a denial that change is an adjective of things. "There are movements, but it is not necessary that there should be permanent objects that move, . . . change does not need a support."[15] True also, if a denial of a supporting substratum, the X substance of tradition. But a change, or, movement, with such continuance as we have contended for, also implies both denials. Moreover, Bergson's favorite example, the mystical experience, in exhibiting the mystic as enduring the route, is an elementary instance of that relativity of change to persistence, which we have in mind.

In the second place, this relativity, besides empirically plain, is rationally intelligible. It involves no contradiction. Conceive change as pure change without the least continuance. Definite rational discourse about events is not possible. W. E. Johnson writes: "If we consider what is involved in defining or describing an occurrence, we find that it must always entail reference to a continuant; and that one occurrence is defined as agreeing with or differing from another, by reference to the *properties* of the continuant concerned. For example, the occurrence described as drinking water is different from the occurrence defined as drinking ether . . . by reference to the different properties or potentialities implied by the terms ether and water

[15] H. Bergson, *Perception of Change,* p. 24.

respectively."[16] Accordingly, any person who denied the continuant and tried to describe any definite occurrence in illustration of his view, would be forced ultimately to contradict himself. Continuants must be affirmed. Conversely, in affirming continuants, conceive the continuant as a pure identity with a route excluding all differences, and change would be impossible, and contradiction again would arise. But we have denied one hundred percent inheritance. Tying change to continuance in the manner in which we do, satisfies the above-stated demands of discourse without implying such logical suicide.

Events, then, are relative to continuants. The requirements of intelligibility and the evidence of experience, uphold this view. And continuants are relative to events, as already shown. How conceive this relativity? How characterize more precisely this ubiquitous inter-relevance of each principle to the other?

Uncritical thought and traditionalist philosophers, such as the idealists mentioned, interpret change as a quality of things. This interpretation has been rejected. Some recent writers go to the opposite extreme, interpreting objects as qualities of events. A. N. Whitehead writes: "objects can be looked on as qualities of events."[17] "The character of an event is noth-

[16] W. E. Johnson, *Logic,* Part III, p. 71; italics in text.
[17] *Principles of Natural Knowledge,* p. 60.

ing but the objects which are ingredient in it and the ways in which those objects make their ingression into the event."[18] Perhaps, such a view is tenable, if you mean by objects abstract universals, eternal permanences existing without space and time.[19] In any case, we have taken continuants differently. They have been taken as particular things, not abstract universals, as inheritant strands, not pure identities, as existing in space and time, not without space and time. Such continuants do furnish qualities to events, so that events can neither be described nor defined properly without reference to them. But as particular things, individuated and definite, contributing character to the processes molding them, continuants are clearly far more than the adjectives or qualities which they thus allow.

Consistent with our view of the continuant, then, our interpretation of the relation between the event and the continuant must differ from Whitehead's, and from the traditional view. As I see it, this relation should be interpreted by us as the relation of substantival inter-ingredience within concrete fact. Concrete fact is fact in its completeness, and events and continuants are relative substantives mutually inter-requisite in fact in its completeness.

Let me state this more precisely. Concrete fact may

[18] *Concept of Nature,* pp. 143-4.

[19] *Principles of Natural Knowledge,* p. 63: "The object is permanent, because (strictly speaking) it is without space and time."

be viewed in any one of three ways. On the first view, concrete fact is a plurality of variously related things, individual qualitative material, energy inherited in strands amid flux. This is the standpoint of our first chapter. This standpoint emphasizes the qualitative formed energy which is analyzed in the chapter. But the continuant is recognized there as in process, as an energy configuration ingredient in route changes. Indeed, that is just what it is, according to our first chapter.

On the second standpoint, taken in this chapter, concrete fact is a multiplicity of variously related events, processes with quality derived from the material developing at their hands. This standpoint emphasizes the route changes, not the continuant material. But it recognizes that these changes, whatever their origin, are simply ingredient in the continuant material. That is, they occupy its route, develop its being over the route, carry its existence forward to novel material display. And they are nothing apart from this material. This is the principle of relativity stressed in this section. Of course, the continuant is not the mere processes. It is the configuration in the processes. But the processes are not apart from the configuration. Process is always involved in the being of things, as things are always involved in process, and when one takes the standpoint of process, things are seen to be

necessary for the character of process, just as, when one takes the standpoint of things, process is seen to be necessary for the existence of novelty in continuant routes. Thus, the two substantives, the thing and the process, always exist in each other, mutually contributory to each other. This is the principle of substantival inter-ingredience precisely described.

Incidentally, the view of events here as route ingredients carrying material to new states, functioning as causal substantives, is the only proper view of events, in relation to continuants. Events are always involved in route continuance. They do not work alone. This is relativity. And as route ingredients, events are always causal. They are always developing the material to a new state of being. They function, not as fixed points of definiteness in material states, as adjectives, but as on-goings shaping the being of the novelty which then becomes fixed in the routes.

Finally, concrete fact, as I have suggested, may be viewed from a third standpoint. On this, concrete fact is a complex system of flux and things with patterns of various sorts connecting the events and things, which are inter-connected. This standpoint, which is proper to our third chapter, is now also to the fore. Like the other two standpoints, the business of this is to facilitate analysis by emphasizing one strain of fact above others, without losing sight completely of the others.

This strain is relation or structure. The relevance of this standpoint here is that it recognizes explicitly the ubiquitous inter-relation of flux and things, already implicitly recognized, as we have just seen, by the other two standpoints.

Events, then, are causal substantives. Continuants are selective substantives (Chapter VI). And the two always go together, existing with and in each other. Things always exist in process, giving character to process. Processes always exist in material routes, shaping new existence for materials along the routes.

Plainly, the principle of substantival inter-ingredience is one of the most basic of all principles. It takes us squarely into the complex wholeness of concrete fact, and, perhaps for the first time, brings out with some justice our full vision of this fact, overcoming the incompleteness implicit in the analytic stress heretofore dominant. Our full view and its synopsis, however, must be postponed until analysis is more advanced. Particularly, we must see more deeply into the nature of relation. Substantival inter-ingredience stresses the fundamentality of relationality in concrete fact. And in some ways relationality, which is our third first principle, is the supreme *summum genus.* This importance is recognized by allotting the analytic discussion of this principle four full chapters beginning with the next.

Much, however, remains to be said about events, and a good deal of this can be handled at once by turning to a discussion of the philosophical problems raised by the principle of evolution.

3. *Evolution.*

Probably to most informed people, evolution suggests Darwin and the origin of the species. But evolution is a wider term than organic evolution. Physical science contains theories of geological and astronomical evolution. And in the social sciences, the evolution of a nation, a race, a personality, is sometimes mentioned. In this section, I wish to determine the meaning of evolution in the wide or cosmic sense, evolution as exemplified in all types of routes, physical, organic, spiritual. In this connection, the relation of evolution to progress, complexity, and purpose, will also be considered. A final section will introduce the topic of the place of evolution in the whole of reality, and, although this topic will not be finished, something will be said about the doctrine of emergent evolution as a picture of cosmic process.

What, then, is the meaning of evolution as a worldwide principle of process? The proper answer is, I think, that evolution in this sense is simply change. There is no real difference between them.

Change is transition to the new. Now, the novel

state of affairs arising may be viewed merely as so much more novelty, which it is. In this case, the transition is spoken of as a mere change. On the other hand, this novel state of affairs may be looked on as the outcome of the transition, or set of transitions, leading to it, which it also is. And when this is done, when the novelty is appreciated, not as so much more mere novelty, but as the cumulative outcome of the antecedent transition, or set of transitions, this transition, or set of transitions, which are changes, are spoken of as an evolution.

Let me guard against one misunderstanding. This is that evolution is, on our view, a subjective category, a mere function of one's private mode of appreciation of events. This is not meant. Events are evolutions as transitions culminating in novel outcomes. And this is what every change as transition to novelty also is. Hence, events as changes do not become evolutions by subjective appreciation. They are already evolutions, the subjective appreciation doing no more than revealing that these events, besides changes, are also evolutions.

Now, I think it will be granted generally that an evolution is a change. But some will contend that evolution is more than change. The major additional elements contended for, I believe, are complexity, purpose, and progress. Evolution is a change to a more

complex state of affairs. Evolution is a directed and purposive change. Evolution is a change spelling progress. Should any one of these three elements, complexity, purpose, progress, be admitted to be part of the meaning of evolution in the wide cosmic sense, evolution as it occurs wherever it does occur throughout the universe?

First, complexity. Herbert Spencer, who believed evolution to be a cardinal first principle, is probably most responsible for the belief that evolution is transition to relative complexity. Yet many instances tell against this view. To mention a few: the career of radio-active substances; the development of coal from decay of living matter; the loss of organs, such as toes and digestive tract, in the development of animals. All of these are evolutions. They are cumulative processes, exhibiting the emergence of novel outcomes developed from pre-conditions. Yet all of them are instances of transitions to relative simplicity. The ends are less complex in structure and function than were the beginnings. Doubtless, many evolutions are transitions to relative complexity. This is not denied. But our question is whether evolution universally, evolution as it appears wherever it does appear in the cosmos, is transition to relative complexity. The instances cited are proof against such a view, and establish that complexity should not be looked on as a character of

evolution viewed as the philosopher should view it and Spencer did, in its cosmic, world-wide form.

Second, purpose. Does evolution universally involve purpose? This question is complex, because the word purpose is exceedingly ambiguous. It has manifold meanings, as we shall see (Chapter VI). To simplify, I shall deal here only with two. First, purpose may mean conscious prevision, as when a person acts, knowing what he is trying for. In this sense, some evolutions are known to be purposive, but the overwhelming majority are not. Moreover, in these latter cases, it is unnecessary to assume that they are purposive in the present sense, in order to interpret them as cases of evolutions. Consider, for example, the development of a cliff by soil erosion. Here is a case interpretable as the emergence of an outcome developed cumulatively from antecedent transitions, an evolutionary growth. Yet, so to interpret it, requires not at all the supposition that the material knew where its route was leading. And the route processes would still completely stand as an evolution, supposing the material did know nothing of the sort, as seems the case. Besides conscious prevision, however, purpose may mean, possessing direction and termination, an end. In this sense, I think, every evolution is purposive. Every evolution is a transition to a novelty which constitutes the direction of the evolution and the termination. Every evo-

lution is an advance toward a novel outcome as an end. The novelty may or may not be foreseen, prevision need not be universal. But, if there is evolution, there is always trend toward an outcome, and the trend culminates in the novel outcome, and the outcome is its end. Purpose, then, in the sense of end, is universally found, wherever evolution is.

Third, progress. Does evolution universally involve progress? The supposed evolution of man from a lower animal form, of modern civilization from primitive conditions, are cases frequently cited. But here again is ambiguity. Progress may mean merely advance to an outcome, as when the physician speaks of the progress of a disease. In this sense, that is, progress as progression, evolution universally clearly involves progress. But this is not the sense of progress usually intended. Progress usually means advance to a more valuable outcome, an end more important than the beginning for human happiness, and sentience. Now, one may doubt very much whether evolution universally involves progress in this sense. The supposed evolution of man from lower animal forms is paralleled by the supposed disintegration overtaking the solar system. And in the historical series, disorder and suffering, war and famine, drought, plague and universal death, have all been, and still are, termini of cumulative advances. In general, evolution, viewed

in its full diversity, seems to involve loss and plenty of it, as well as gain, so far as creature happiness goes. Less valuable termini appear widespread, if not predominant, in the working out of the forward tension in things.

This last observation raises a question which has split philosophers into two groups, optimists and pessimists. In the form in which the question leads to this split, it is, I think, not a question of first principles. The question is: how much goodness, how much badness do evolutionary processes manifest? The optimist answers, not so much badness as goodness; the pessimist, the reverse. Each gives an estimate of the comparative values of the processes. Insofar as a study of first principles touches the question of value, however, its interest is not to make any detailed classification of the values of items, but to determine the inclusive universal nature of value as possessed by items. This broad approach to value, seeking its universal nature, describing value from the standpoint of the whole, is everywhere its characteristic approach. Thus here, it states that the inclusive or universal nature of the value of evolutions, is non-uniform in type, not merely of that one type implied by the word progress as commonly understood. This is a proper point. But, how many evolutions belong to one type, how many belong to another type? This question, which

splits optimists and pessimists apart, does not concern the universal nature of the value of the items, but the membership of the classes which fall under this universal nature. How many instances belong to this subclass, how many to that? Such an enquiry, confined within a field whose universal character has been independently determined, is properly the business of a special science, such as axiology, instead of a general study of first principles.

Universally, then, evolution does not involve complexity, purpose, or progress in their ordinary senses. Evolution is change. And the purpose and progress it universally involves are such as are involved in change. This result permits us also to hold, that not only is evolution change, but change is evolution viewed universally. Primarily, this position is based on an empirical survey of evolution as it occurs wherever it does occur in the universe. So surveyed, evolution shows itself to be simply change with that non-uniformity regarding complexity, purpose, and progress in their ordinary senses, which change shows. This empirical survey was incidentally suggested throughout the whole preceding argument.

An additional point is in place here. Since change is evolution and events change, events are evolutions, evolutions events. This means that events are growths,

characteristically creative. Characteristically, continuants are conservative, retaining what was, whilst events bring forth what was not. This is not the whole story about continuants, since, as we shall see, continuants have a creative side. But creativity certainly is an essential in the story of events, and should have place in a rounded account of events. This introduces the subject of emergence.

4. *Emergence.*

Being simply change, evolution, as described above, is a first principle. It also pervades all routes. How picture evolution as pervading all routes? And what shall we say of the doctrine of Emergent Evolution? In this section, I will give our answer to the second question, reserving what is left unsaid about the first for the seventh chapter.

Before proceeding, let me deal with a dialectical difficulty. In Emergent Evolution, we pass to a survey of the organization of evolutions in reality as a whole. Now, a reality in its full being has not the character of changing. This is the idealist argument already granted. And change is evolution, and reality as a whole is a reality in full being. Hence, the whole of the real cannot be said to have the character of evolving. From this truth idealists have drawn the conclusion that evolution is not real. The proper con-

clusion, I think, is merely that evolution is not a quality of the whole of the real. An evolution is a constituent member within this whole, a substantival part, not a pervading adjective.

Now, this position may be held to be contradictory. This is the dialectical difficulty. I think, however, that the position is not contradictory. It holds that the whole of the real as a whole does not evolve, but that myriad members within this whole are evolutions. To believe this contradictory, I think, is to commit oneself to a form of the whole-part fallacy. The whole as a whole does not evolve, therefore, the parts as finite parts cannot be evolutions. This is similar to saying that the whole as a whole cannot breathe, therefore, breathing cannot be a finite item in the whole of the real. The contradiction supposed in holding that evolution is a substantive part yet not a pervading adjective of reality, vanishes, I think, once the distinction between quality and part already developed, is remembered. That evolutions are substantival parts, has been shown in the discussion of change, where we saw that changes are substantival members of concrete fact.

Now, for emergence. First, the existence of emergent qualities and relatedness of a type, seems unquestionable. Consider the common example: water formed by fusion of hydrogen and oxygen in a eudiometer. The new state of material arising, shows

considerable carry-over. There are the atoms of hydrogen and oxygen, and the electric potential, with their mass and general physical properties. Yet, as a matter of empirical fact, there is also a new whole which did not pre-exist, with qualities not detectable in the parts as unjoined. There are emergent qualities and relatedness.[20]

Second, the existence of emergent qualities and relatedness of this type, is not only unquestionable fact, but entirely congruent with our theoretic account of fact. Material carries over in routes. Hence, there will be the so-called resultant items. Qualities manifest the definiteness pervading constituted material. Hence, if material assumes a constitution which did not pre-exist, as the hydrogen and oxygen and electric charge do here, qualities will appear, in order to manifest the definite nature of the constitution which, *qua* definite, did not pre-exist. The new individuality will be defined by new quality, its newly achieved nature manifested by new types of definiteness, for it is the function of quality, according to our theory, to do just this. Finally, with the occurrence of new form will occur emergent relatedness, the so-called new individual. In this general sense, where emergent evolution is but recognition of the matter of fact creativity of

[20] Lloyd Morgan, *Emergent Evolution,* p. 19, distinguishes relatedness from relation. Relation is the structure of a whole, relatedness is the organized whole, terms plus relation.

new individuality and of its manifestations by quality, the emergent doctrine is wholly within principles already developed in previous sections.

The official Emergent Theory, as expounded by its leading advocates, Lloyd Morgan and Samuel Alexander,[21] however, is not so matter of fact as this. Primarily, it is an attempt to depict the organization of cosmic evolutions by an emergent hierarchy. It depicts the whole of the real as composed of a set of levels: matter, life, mind, spirit (Morgan), space-time, matter, life, mind, deity (Alexander). Emergence proper exists between the levels. Each level is conceived to have emerged in the course of time from the level immediately below it, and to consist of the 'substance' of the lower level with a new distinctive level-quality (Alexander), or, in a new distinctive level-relatedness (Morgan). Thus, beings at the level of life, according to the theory, have emerged some time in the past from beings at the level of merely physical matter, and consist of physical matter with a further quality, or in a new relatedness, called life. The result is a picture of cosmic evolution in the form of a pyramid, with space-time (Alexander), or matter (Morgan) at the base, existing by itself in the remote past, and deity

[21] S. Alexander, *Space, Time, Deity;* L. Morgan, *op. cit.* For convenience, in this discussion I will spell emergent theory with capitals E and T, where I mean the official Emergent Theory of Morgan and Alexander, as distinct from the general principle of emergence.

(Alexander), or spirit (Morgan) at the apex, a relatively recent offshoot of the creative advance from space-time, or from matter.

This pyramidal scheme of the Emergent Theory, as a formal classification of continuants, is valuable, particularly its conception of living beings as also physical beings, spiritual beings as also physico-vital. But the main purpose of the pyramidal scheme is to give a historical picture of the events of the cosmos, to give a comprehensive genetic map of events. In this respect, the scheme seems to me open to criticism.

First, the Emergent scheme conceives life and mind to have evolved from matter and motion. Now there are no known instances of such an evolution,[22] there are merely insecure speculations.[23] At the same time, there are plenty of known instances of evolutions in the opposite direction: *e.g.*, the lapsing back of all or-

[22] The growth of mind and spirit in civilized human beings around us, is not an instance of life and mind emerging from dead matter and motion, but of mind and spirit emerging from already living material.

[23] Current cosmogenetic speculations by scientific men favor the view that life follows matter in the historic series. But this view is based on highly complex indirect evidence, the balance of which may be upset at any time by endless relevant factors yet indeterminate. In short, the view is a speculative fancy of our scientists, a parallel of an inverse fancy of our priests, who put spiritual Life before matter: "In the beginning, God . . ." Such fancies have place, particularly in lay thought, where they agitate the imagination, and provide good copy for popularizers. Our point is that a critical philosophy which is empirically and rationally sound, should not rest the heart of its case on such insecure speculations, as Emergent Theory does.

ganic and spiritual beings around us into physical matter. Furthermore, the remainder of known evolutions other than these last, excepting the growth of spirit in human beings already alive, are developments within one of the major levels of the Emergent hierarchy: matter, life, mind. Thus, the Emergent scheme crowds into the corners of the canvas practically all types of evolution now known, whilst putting in the center, as its crux, a type of evolution (life-mind from dead-matter-motion), which, for all we know now, may be purely mythical.

Second, this center of the Emergent scheme is not only empirically insecure, but insecure theoretically. Alexander requests us to accept hierarchical emergence with Natural Piety,[24] whilst Morgan tells us to "Consider and bow the head."[25] And when our authors pass from pious statement to philosophical explanation, they offer no additional real security. Alexander falls back on the old saw that Time brings forth everything. Morgan invokes Divine Activity. But such theoretic bolsterings have been used in more ways than one. In *Creative Evolution,* Henri Bergson used Time (*durée*) to show, as he supposes, how dead matter and

[24] *Natural Piety, Hibbert Journal,* Vol. 20, p. 609. Natural Piety is defined as the habit of not asking too many questions of Nature. The parallel of the scientific prophet with the priest, cited in the preceding note, is amusingly obvious.

[25] *Emergent Evolution,* pp. 4-5.

motion evolved from life and mind, inverting Alexander. And long ago Fichte, for instance, inverting Morgan, used God, Divine Activity, to show the anti-Emergent position. The fact is that a principle such as Time or God, if attributed omnipotence, as in all cases here, can be brought into any argument anywhere, used to demonstrate any abstractly consistent position or its opposite, and, in consequence, is not a decisive explanation of anything. It lends no real theoretic bolstering to any position indecisive or not, without it.

In its picture of the organization of cosmic evolution, then, the official Emergent Theory emphasizes a type of evolution which is insecure, theoretically and empirically. It centers the weight on a point which is highly speculative, a fancy of many current scientists, as its opposite is a fancy of certain current religious thinkers. The moral of our critique is not that the official Emergent Theory is false, since it has some probability currently, but that its scheme is unwise. A picture of cosmic evolution based on sound evidence and matter of fact theory, would do better not to lay central weight on the point where Emergent Theory lays it. Such a picture should provide a canvas wide enough to admit into it, besides known instances, such instances as the Emergent Theory emphasizes, if these instances show themselves to be more than speculations.

But the picture to be secure should be inclusive without putting its center where the official Emergent Theory puts it, centralizing now insecure fancy. With these specifications in mind, I have sketched very briefly in Chapter VII an alternative picture of cosmic evolutions.

In the meantime, let me stress two points. First, our critique of the official Emergent Theory does not involve a sweeping denial of the general principle of emergence. As stated in the earlier part of this section, the principle of emergence, as a matter of fact theory of creativity, fits completely within our account. And it is used throughout: *e.g.*, in our sixth chapter, we accept the emergent explanation of mind and spirit in human beings about us. Second, the Emergent Hierarchy, as a static picture of continuants, is also part of our doctrine. The hierarchy is taken as depicting, not a temporal succession of events, but a formal classification of continuants. And it is taken as including primarily three major levels: physical, vital, spiritual, as described in Chapter I. With these reservations, however, the continuant members of the hierarchy are just as Morgan and Alexander describe them, so far as their a-historical or materio-formal relations to each other are concerned.

In conclusion, let me indicate that the classification of continuants described in Chapter I, is unaffected,

whether the Emergent Theory, as the empirical evidence unfolds, shows itself to be right or wrong.

One reason Alexander adopts the official Emergent Theory is the belief that it makes reductive Naturalism convincing. This is not the case. Should life and mind be shown completely to have emerged aeons ago from matter and motion or from space-time, it would not follow that life and mind are nothing but matter and motion, that Naturalism is supreme. As I say, Alexander seems to believe it would. He writes: "each new type of existence when it emerges is expressible completely and without residue in terms of the lower stage," ultimately, hence, in terms of the lowest stage, which, in Alexander's scheme, is mere space-time, or mere motion.[26] But, if Emergent Evolution is true, this is certainly false. The very meaning of emergence is that now in the present is a novelty which did not exist in the past. Hence, if emergence is true, life and mind are something in addition to mere matter and mere space-time or motion. They are genuine and distinctive novelties over and above mere matter and mere space-time, hence, not reducible completely to the terms of these antecedents as antecedently given.[27]

[26] *Space, Time, Deity,* II, p. 67.

[27] M. W. Calkins, *The Dual Role of Mind in the Philosophy of S. Alexander, Mind, N. S.,* Vol. 33, p. 197 *ff.,* brings out very clearly, in the special case of mind, the conflict in Alexander's philosophy between

In sum: if the official Emergent Theory, as fact unfolded, showed itself true, its very truth would mean that there were at least three genuinely distinctive types of continuants, as we hold. It would contradict any reduction to one, such as Naturalism contemplates. At the same time, if the Emergent Theory showed itself false or improbable, as such fancies often do, our classification of continuants would also remain unaffected, since it is not based on any such theory of remote genesis, but simply on a survey of the nature and relations of things as these show themselves in the fullest sweep of available critical experience.

the doctrine of Emergence which implies that mind is more than mere space-time or mere motion, and Alexander's reductive Naturalism which holds that mind is nothing but mere space-time, or mere motion.

CHAPTER III

Relations

1. *Structure.*

In the previous chapter, I said that concrete fact may be viewed as a complex system of events and things, with relations of various sorts between the events [1] and the things,[2] which are inter-related (inter-ingredience). The universe is a relational whole of fact. This view is the standpoint of the present chapter, which analyzes relationality. Our main business is two-fold: first, to analyze the general meaning of relation, freeing it from supposed viciousness which has led some to declare relations unreal (sections 1, 2); second, to denote and clarify various major types of relations, suggesting thereby the range of reality covered by the word relation (sections 3, 4). In a fifth section at the end, a third question, concerning subjectivity, is also discussed.

[1] A. N. Whitehead, *Concept of Nature*, p. 142: "An isolated event is not an event, because every event is a factor in a larger whole and is significant of that whole."

[2] A. N. Whitehead, *Adventures of Ideas*, p. 197: "We habitually speak of stones, and planets, and animals, as though each individual thing could exist, even for a passing moment, in separation from an environment which is in truth a necessary factor in its own nature." *Cf.* internality, section 3, below.

I will begin by mentioning two common misconceptions of relations.

First, ordinary language describes a relation as a 'tie between', a 'bridge over', *etc.*, suggesting that a relation is a concrete thing stretching between two things. Such descriptions are metaphorical, and perfectly harmless if taken metaphorically. Taken literally, however, they are erroneous, and even dangerous. The second of the two difficulties F. H. Bradley finds with relations is largely due to taking a relation as a third thing. Properly viewed, a relation is not a thing stretching between two other things, as a chain between two fasteners, or a bridge between a river's banks. A relation is not a thing at all; that is, it is not a continuant. And a relation is not between its terms but in its terms. Or, better, its terms are in it. To interpret a relation as literally a thing stretching externally between two other things, is doubly to confuse relation with an altogether different type of reality.

Second, not only not a concrete thing, a relation is not merely an abstract universal. "It is generally held," Whitehead writes, "that relations are universals, so that A can have the same relation to B as C to D." [3] According to Whitehead, there can be no objection to this view. "But," as he concedes immediately afterward, "with this meaning of the term, a relation cannot sig-

[3] *Adventures of Ideas,* pp. 295-6.

nify the actual connectedness of the actual individual things which constitute the actual course of history." This seems to me one objection to this doctrine. That is, it is perversely arbitrary, I think, to restrict the good word relation, so that it excludes the actual connectedness of the actual individual things of concrete fact.[4] In addition, the view that relations are merely abstract universals, leads to paradox. It paves the way, as Whitehead admits in the same context, for "Bradley's objection that relations do not relate. Three towns and an abstract universal are not three connected towns." If the view that relations are merely abstract universals, leads to the paradox that relations do not relate, this seems to me a second, and decisive objection to it. I conclude that the proper view is that relations cannot be merely abstract universals, indeed that relations are primarily illustrated by the actual connectedness of the actual individual events and things of concrete fact, Bradley's underlying unity. This actual connectedness 'relates', and a relation which does not 'relate' seems to me, to that extent, no relation at all.

What, then, is a relation? Not a thing, not merely a universal, a relation may be as concrete as any thing, as abstract as any universal. On our view, relation is the structure present within realities. Wherever there

[4] F. H. Bradley, *Appearance and Reality*, 8th Imp., p. 582: "All relations . . . are the inadequate expression of an underlying unity." On the contrary, the very archetype of relation, as I think, is the underlying unity.

is structure, in concrete or in abstract, there is relation, and vice-versa. The form of the qualitative material of a particular continuant, the material structure of its parts, is, for instance, a relation. And this form is as concrete as the continuant. It is a particular structure embedded in just this particular material, a resident principle of its individuation. An abstract universal, however, may equally be a relation. Consider identity. Continuant A is said to be abstractly identical in form with continuant B. As concrete items, the two continuants are two things with two forms. But the form of one is repeated in type by the form of the other. And the principle of identity, the abstract universal, serves to unite the two logically, to structure the two together in respect of type-form.[5] In abstract or in concrete, then, where there is relation, there is structure, and wherever structure, relation. This is our general description of relation.

This description will be extensively verified when we consider the major types of relations. In the meantime, to add security to our general account, perhaps I should deal more explicitly with Mr. F. H. Bradley, whose

[5] Although uniting manifolds logically, such abstract universal relations as type identity do not physically unite anything, *e.g.* three physically united towns. Physically, they are relations which do not relate. Bradley's paradox really represents the truth that abstract universal relations do not relate things in every way things are related. But the moral of this is not, as Bradley suggests, that relations are unreal, but, as I have said, that relations are not merely abstract universals. Other relating connexions exist. On universals, see below, section 3.

spirit hovers like a belligerent ghost over all recent discussions of relations.

2. *Bradley.*

Bradley holds that reality interpreted relationally is unintelligible, that the real world, properly apprehended, is somehow transcendent of all relations. This position is based on two main reasons which I will summarize partly in Bradley's own words,[6] then discuss critically.

First, relations require terms. But each term in a relation has a dual character. It supports the relation, since a relation could not exist without terms. And it is something made by the relation, since a thing is not a term except in a relation: a chair contiguous with a table is not that term except in the relation of contiguity with the table. Let us call any term in relation, A. Accordingly, A in relation R has two aspects, M and N, the term as supporting R and the term as made by R. And plainly these aspects must be related, otherwise A falls apart, and is not a single term, as initially supposed. Let us call the relation between M and N, R_1. The term A, then, properly viewed, is really M R_1 N. At once we see, however, that M and N, like A, have dual characters: each supports the relation R_1, each is made by the relation R_1. In conse-

[6] *Appearance and Reality,* 8th Imp., Chapter 3, Sects. 2, 3.

quence, each term itself divides into two aspects, M into T and O, N into Y and Z, the term as supporting R_1, the term as made by R_1. And plainly each aspect of each term is related to its twin, since M and N are both single terms. Let us call the relation between T and O, R_2, the relation between Y and Z, R_3. Then, the term M, properly viewed, is really T R_2 O, and the term N is really Y R_3 Z. Once again, however, we see that T and O, Y and Z, as standing in a relation, have, like A, M, and N, dual aspects, further that these aspects are related, and that as related they themselves divide into subordinate aspects, and that this process has no end.

In sum: relations require terms. But to grasp what is involved in a single term, A, requires the completion of an infinite process, an impossibility. Hence, to try to apprehend reality as if it were composed of terms in relation, is a blind alley. It can never succeed, and should not be attempted.

The second argument, which reaches the same result from a different approach, is as follows. Terms require relations. "But if it (the relation) is to be something to them (the terms), then clearly we now shall require a *new* connecting relation. For the relation hardly can be the mere adjective of one or both of its terms; or, at least, as such it seems indefensible. And, being something itself, if it does not itself bear a relation to

its terms, in what intelligible way will it succeed in being anything to them? But here again we are hurried off into the eddy of a hopeless process, since we are forced to go on finding new relations without end. The links are united by a link, and this bond of union is a link which also has two ends; and these require each a fresh link to connect them with the old. The problem is to find how the relation can stand to its (terms); and this problem is insoluble."[7]

In criticism, I will set down two general comments on these arguments, then a single comment on each argument.

First, Bradley's arguments, or any rational arguments purporting to show that relations are unreal, involve their own refutation. This can be shown in several ways. For instance, all such arguments are chains of reasoning. But all reasoning involves some identity. More precisely, a term in a rational discourse must have some identity of meaning throughout the discourse. Otherwise, the reasoning is a chaos of ambiguity. Since Bradley's arguments are chains of reasoning, they require, therefore, to hold at all, the presence of the relation of identity within them. Hence, Bradley can reach his conclusion that all relations are unreal, only by means of a factor which, as real and necessary for reaching any such conclusion,

[7] *Appearance and Reality*, pp. 32-3; italics in text; parentheses mine.

means that the conclusion cannot be valid when it is reached. This same point, the implicit disproof in Bradley's own arguments, may be shown in other ways. For instance, Bradley's arguments claim a truth which is apprehensible. But under what conditions could their truth, if any, be apprehensible? Clearly, one necessary condition is that the arguments conform to the general demands of truth. Hence, to apprehend Bradley's arguments as true, requires the existence of the relation of conformity-to-the-general-demands-of-truth. Or, to know that Bradley is right, necessarily involves the existence of a condition, which, as real, means that he must be wrong.[8]

Second, Bradley's arguments assert that real wholes, in the act of being viewed relationally, break up into infinite series. Since such series can never be completely traced out, real wholes cannot be intelligibly grasped relationally. Suppose real wholes split up as Bradley claims. Are they then incapable of being grasped intelligibly? It is now well recognized, I believe, that any serial whole is understood and intelligible, if we know some of its terms, and the principle of entry of the other possible terms. Then, we know in principle what the series amounts to. Now, these conditions are satisfied by the two infinite series alleged

[8] A. N. Whitehead, *Principles of Natural Knowledge*, p. 12: "'significance,' which is experience, . . . is the relatedness of things." If Bradley were right, could he, or anyone, really experience the fact?

by Bradley. In the first, we know A, M and N, T and O, Y and Z, some of the terms, to which I have given letters there, whilst the principle of entry of the other possible terms is that each is derivative as an aspect of a term immediately above it in the series. In the second series, we know the there unlettered original connecting link R and subordinate connecting links R_1, R_2 *etc.*, whilst the rule of entry is that each new term of the series is a link connecting the ends of links generated immediately before. Of both Bradleyian series, then, we know some of the terms, and the principle of entry of the other possible terms. The general conditions of intelligibility regarding series are satisfied. We know in principle what each series amounts to, what each serialized reality is. Indeed, far from being hopelessly unintelligible as Bradley claims, these serial wholes are as intelligible as the only whole which Bradley believes to be real, *viz.*, the Absolute. Of the Absolute, on Bradley's own showing,[9] we know only the general principle, and some details. The remainder, as Bradley confesses, escapes us completely.

These two critical comments meet the two Bradleyian arguments on their own ground. The comments are dialectical, but so are the Bradleyian arguments. It may seem superfluous to criticize the arguments in detail. If wrong in principle, it is of

[9] *Appearance and Reality*, Bk. II.

little significance whether they are right or wrong in details. I will venture one detailed criticism of each argument, however, because it will shed additional light on the general nature of relations, and of terms in relations. The criticism will consider whether the infinite series alleged by Bradley and supposedly suicidal to the reality of relations, are illusory, or truly real.

In the first argument, the infinite series is generated by assuming that a term in a relation has a dual character, it supports the relation and it is made by the relation. I believe that terms, properly viewed, have neither of these characters in any sense which allows an infinite series to start. As a matter of convenience, I will consider primarily the character of supporting, discussing the character of 'having been made by' where it has an intelligible meaning correlative with the meaning of supporting under consideration.

The word support here has several possible meanings. First, it may mean that a term stands under a relation as a column underneath an entablature. I doubt whether this is meant here. In any case, such a view implies that terms are things outside their relation, not in it, and that their relation is a third thing outside its terms. The defect of this conception of terms and relations has already been suggested. Second, the term support may mean that a term keeps its relation in existence as a persistent cause supports or keeps in exist-

ence a persistent effect. Correspondingly, the character of 'having been made by' would mean, that a term as a term is brought into existence by its relation. In other words, support and 'having been made by' may mean that terms and relations stand in mutual causal dependence. Such a view of terms and relations is also a misconception. First, a term cannot cause its relation to exist. A term must exist in a relation to be a term of that relation. Hence, a term does not exist and is not in a position *qua* that term to cause anything to exist, unless the relation of which it is a term is already in existence. Similarly, a relation cannot cause its terms to exist. A relation must exist with its terms to be the relation of those terms. Hence, a relation does not exist and is not in position *qua* that relation to cause anything to exist, unless the terms it relates are already there in existence with it. Thus, causality between terms and relations is out of the question, because neither a relation, nor its terms, exist and are in a position to cause anything as such, unless the other is already caused, and in existence.

Thirdly, the word support may mean to serve as ground. A term supports a relation in the sense that a relation to be a relation implies terms. Terms must be there for the relation to be there. Correspondingly, the character of 'having been made by' would mean that terms to be terms imply a relation. To be terms they

need a relation there. Unfortunately, this interpretation of support and 'having been made by,' which fits the situation and seems to be what is meant, is not favorable to originating a genuine infinite series. A supports R as being implied by (needed by) R, A is made by R as implying (needing) R. But this produces no real split in A. The A implied by R is the A implying R, the A implying R is the A implied by R. The two really are not two, but one: the duality is entirely linguistic. A real infinite series here, however, requires a real split. A must somehow become two real terms. In the present sense of support and having been made by the A that supports is the A that is made. A is A without a split into terms requiring a fresh relation. Thus, if the present sense of support and 'having been made by' is intended, as seems fitting, the infinite series alleged in the first argument is purely verbal, not real.

In sum: support and 'having been made by,' the characters of terms said to generate an infinite series in the first Bradleyian argument, may mean that implication, causation, or externality, exist between relations and terms. Implication does not yield a real infinite series. Externality is error. And causality is out of the question because neither a relation, nor its terms exist and are in a position to cause anything as such, unless the other is already caused, and in existence.

The infinite series in the second Bradleyian argument requires only brief attention. The second argument is based on the assumption that a relation to be anything at all to its terms requires a fresh relation to them. Out of this assumption, the infinite series is generated. Samuel Alexander has pointed out that, if a relation to be a relation of its terms needs a fresh relation to its terms, "it is not doing its work of relating."[10] A relation is not an external thing or term in need of a new relation to its terms in order to relate them, but the unity in which the terms as its terms already exist.

As a whole, Bradley's arguments against relations tacitly require and employ principles which, as holding, contradict and refute the explicit conclusions of the arguments. And even if the arguments were free of self-contradiction, they would be harmless. At most, they show that if you conceive relations and terms in certain ways, you will be committed to infinitely complex, intelligible systems. Finally, as a matter of fact, relations and terms, rightly conceived, do not commit one even to such infinite systems. In showing this, I pointed out certain misconceptions of relations, mainly, that relations are causes, and that relations are third things, overtop of and external to their terms, requiring fresh relations to their terms. That a relation is neither a cause nor a thing, neither an event nor a continuant,

[10] *Space, Time, Deity,* Vol. I, p. 256.

is a position not merely incidental in this section, but fundamental in the outlook of this entire work.

3. *Internality.*

Relations are classified variously. Some classifications are not so important for setting before the reader our general view of relations.[11] But two are of considerable importance. The first, which divides relations into internal and external, will be considered in this section, the second in the next section.

The division of relations into internal and external, has been a center of violent controversy.[12] As one might expect, the division really has various meanings. I will mention three.

First, external may mean separate from its terms, needing a new relation to relate it to the terms; internal

[11] Bertrand Russell, *Our Knowledge of The External World,* pp. 47-50, classifies relations as symmetrical, asymmetrical, non-symmetrical, and as transitive, intransitive, non-transitive. These classifications are most important in mathematics. In mathematical theory, an ordering relation is defined, for example, by the notions of asymmetry, transitivity, and connectivity (*Introduction To Mathematical Philosophy,* p. 32); and an ordering relation serves as the principle of mathematical series, the conception of which, in turn, underlies the mathematical theories of space and time, continuity, infinity, and motion. In the next chapter, I shall say something about mathematical theories of space and time. That will indicate, very indirectly to be sure, the calibre of philosophical importance I attach to the classifications of relations as symmetrical, asymmetrical, nonsymmetrical, and as transitive, intransitive, non-transitive. See next section also.

[12] F. H. Bradley, *Appearance and Reality,* pp. 574-582; William James, *A Pluralistic Universe,* pp. 321-326, p. 358 *et seq.; The New Realism,* by E. B. Holt *et al.,* Macmillan 1912.

the opposite. This meaning of external has already been discussed, and rejected. In this sense, all relations are internal. They are in their terms, not loose and outside them.

Second, external and internal may mean non-organic and organic. The members of an aggregate, ten marbles in a bag, say, are often said to be in external relation. A marble is a marble, in a bag or out. That is, the relation of aggregation is external to the marble as a thing of that type. This is not the case, however, with many living things. Sever a hand from a body, the hand can function no longer as a hand, and is no longer a living hand. Relationship of hand to body is not external to a hand as a hand, but requisite so long as the hand is to remain a living hand, a thing of its type.

This classification has an obvious limitation. It is founded on taking terms abstractly, as samples of types. A marble in a bag, as an individual, for instance, is at a certain stage in its history. The relation of aggregation enters into it, structures it transeuntly at this stage, and is manifested by a character in the thing's current nature. It is a form in which the thing as an individual now has its being, hence, involved in the full being of the thing as that individual, or, internal. Consider the marble as a type-sample, however, this relation of aggregation does not enter into

its nature. The marble is still a marble outside, as in, this structural form. The relational form, accordingly, is external here, and the classification of relations into external and internal, as above given, begins to apply.

Within this limitation, the classification has its uses. For instance, as we have already seen, it defines a difference between merely physical things and living beings. This difference between these types, noticed in our first chapter, sums up to this. Merely physical things exist in local environments not specifically requisite in their being as physical. Not so living beings. They require specific local contexts. Their relational externality, *qua* living, appears to be far from unrestricted as regards locale. Again, the classification here suggests that science does not exclude a doctrine of internality. The usual view is that science demands that relations be held to be external. As we shall see in a moment, this demand is legitimate in one sense; and in another sense it may be granted at once, namely, as a demand for recognition of relations irrelevant to the type-nature of a phenomenon. But in the sense of external here, science might be described as a study of internal relations. Whether studying the elements in a field of force, or, in crime and education, the sciences, physical to social, so far as they study relations, study those relations which enter the type-nature of

the investigated fact. These sciences are interested in a given crime, or, a given field of force, not as a peculiar individual, but as a type-sample. And the relations they investigate here are the relations entering vitally into its type-nature. That is, the theoretic special sciences investigate internal relations in the present sense of the word.

Perhaps, at this point, a general warning regarding internal relations may not be amiss. One is prone to speak of internal relations as if they were causal agents, *e.g.*, to say that connexion with organic body makes a hand a hand. Such description, however suggestive, is ultimately inaccurate. In respect of its terms, an internal relation is constitutive, but not causal. As observed in the previous section, a relation cannot be a cause of its terms, because a relation does not exist and is not in a position to cause anything as such, unless its terms are already in existence. A relation is a structure in which terms as terms have being. In the case cited, not connexion with body, but growth of organic material in a certain way, that event, makes a hand a hand. The relation is not the cause of this material state, but the connective form in which the term as that term ubiquitously stands when once it has been caused, and has acquired that state. It is the connexion in the term's being as causally set up.

Third, internal and external may mean particular

and universal relations. As a preface to discussing this third meaning, I will state briefly the view of universals held in this work.

Universals are symbolized by such words as 'red' (quality), 'stone' (continuant), 'interaction' (event), 'causality' (relation). On our view, *this* red, *this* stone, *this* interaction, *this* causal relation, are particulars. But each particular has elements in it which are uniform in type with elements in other such particulars: *this* causal relation with *that* causal relation, *etc.* The type-pattern in each of the various thises and thats, is the universal. On our view, then, a universal is a type-pattern equally in each of a plurality of individuals (or universals). This doctrine of universals plainly repudiates the so-called concrete universal. A universal is not a thing, nor an individual system, *e.g.,* a person, a picture, an epoch in history, a universe. These are particulars, or particular systems. Universals are simply elements or patterns of elements equally in such particulars (or universals). Consider the continuants of concrete fact. Each of these has a set of elements (matter, form, quality, *etc.*) whose type is repeated in all such items. Within its individuality, each such item shows a type-pattern of elements also equally in every other such item. This distributed type-pattern is the universal 'continuant.' Universals are in individuals, such as continuants; they do not dwell aloft.

But they are not such concrete individuals. They are type-patterns present throughout a class of individuals (or universals).

Relations, I say, may be divided into particular and universal, which division corresponds to the third meaning of internal and external relations.

Particular relations are internal. As an example, consider the co-existence here, between two individual things on my table. This co-existence is a particular relation. It exists here, between these two things. It is localized in this situation, or, is non-universal. Moreover, it is internal. This relation is a form in which these things have their existence here. It is involved in their being as they are here, internal to this being as here. Indeed, existing nowhere except in the being of these things as they are here, the relation is completely internal.

Universal relations are external. Consider 'co-existence', the universal. As a universal, it consists of a relational type-pattern in many individuals, its instances. In consequence, it may be considered in abstraction from any one individual instance, as outside it. This procedure is familiar in the special sciences. A science studies a given relational situation to determine a universal law, say, the law of gravitation. But the connexion it seeks to trace is not thought to be bound up with just the given situation. It is conceived

to be in myriad situations outside the given one, as external, not merely local. In an important sense, however, universal relations are also internal. A relational pattern, or, a connexion, discovered by a science, is certainly believed to hold in the situation wherein it is discovered, as well as outside it. Moreover, a universal relation is simply a type-pattern in its myriad situations. Its complete being is exhausted in being a pattern internal to all its instances. This position is summed up by Roy Wood Sellars, when he writes: "There are degrees of internality, and complete externality is of the nature of a limit."[13] That is, a universal relation is external, it extends beyond any given relational situation. But it is never completely external. It is internal to the given relational situation illustrating it, and it is internal completely in its total instances, being simply the relational pattern equally in all of them.

In this study, internal and external relations primarily will mean particular and universal. Accordingly, the doctrine of this essay is that all relations, properly or adequately viewed, are really internal. This doctrine is foundational, with many incidental implications, epistemological and suchlike, which will be noticed as we proceed. Its central philosophical implication is that relations do not exist aloft in a Platonic

[13] *Evolutionary Naturalism*, p. 215.

heaven or other world, requiring a Principle to concrete them. There are no two worlds, only one: the ordered whole of fact. And relations exist wholly in this world as structures involved in the being of the terms which they have in fact.

This doctrine of internality, as I have just shown, allows the methodological externality foundational to scientific generalization. In addition, it does not imply organicism (Chapter VII). The contention of internality as here expounded, is not that everything is related in every way to everything else, which is organicism. A relation may not extend beyond a given situation to anything else, as we have just seen in discussing particular relations. Internality here is the doctrine that where a connexion does exist, it does not float. Particular or universal, a relation always exists in the terminal fact it relates. It has its whole being as a structure in this fact. This is the internality principle as understood in this essay.

So much for our first major classification of relations. Its main point is, as I say, that relations always exist as structures of the terminal fact which they relate. Relation is simply a principle of fact. The complement of this point is that the items of fact always exist in relation, that fact is completely grounded in relationality. In the previous chapter, we saw that not only do things always exist in process, but process

always exists in things. Similarly, relations not only always exist in items of fact, but items of fact always exist in relation. In the next section, where we will deal with our second major classification of relations, this point will receive some attention, although its full description will not be completed until later chapters.

4. *Ontological.*

The second major classification divides relations into logical, epistemological, and ontological. This classification is important, both for the general analysis of relations in this chapter, and for the specific analyses in the next three chapters, for which it sets the stage. In this section, I will explain the general meaning of the classification very briefly, mainly employing denotation. The fuller bearing of the classification on the argument of this book, will be developed in the chapters which follow.

Logical relations are relations which hold of real items of any sort. Examples of logical relations are the rules of logic, the so-called laws of thought. "The rules of logic," Morris R. Cohen writes, "are applicable to all objects of any sort, physical or mental, material or formal, real or ideal."[14] Thus, identity. This is applicable not merely to thoughts, but to continuants, events, relations, components and complexes of any

[14] *Reason and Nature*, p. 195.

sort. For instance, any continuant is identical with itself, identical in type with any other continuant, and has some identity, as an item of the real, with any other real item. Identity applies to continuants just as much as it applies to thoughts. Likewise, contradiction: it is impossible for any item to be A and not A in exactly the same sense. This is true not merely of thoughts, but of anything. Another illustration of a logical relation which is of considerable importance, is class inclusion, the principle of class. And this holds universally. Items of the real of any sort, events as well as thoughts, continuants, relations, and so on, are members of a class, and usually of many classes. Such, then, are logical relations. They apply to real items of any type. Customarily, logic is defined as the science of thought, a definition quite suitable for textbooks covering traditional materials. Logic, however, has also been defined as the science of universal form. It is in this latter sense of logic, that relations here are called logical.

Logical relations, as here understood, are regarded by many as the subject-matter of mathematics. Traditional logic studies logical relations as applying to thought in its endeavor to know. Mathematics studies logical relations more freely. A. N. Whitehead writes: "The general science of mathematics is concerned with the investigation of patterns of connectedness. . . . It

is only in some special branches of mathematics that notions of quantity and number are dominant themes."[15] Scott Buchanan writes: "mathematics is not confined to quantitative calculation. It is seen to be the science of relations in their widest extension."[16] And Max Black writes: mathematics "is the syntax of *all* organized systems."[17] Bertrand Russell and others have attempted to develop this general view that mathematics deals merely with relations in their widest extension, or, logical relations, in a specific manner. Very roughly stated, their argument is this. Mathematics is reducible to arithmetic and geometry. Number, the basic term of arithmetic, is definable satisfactorily by means of the principle of class inclusion, namely, as a class of classes.[18] Point, line, plane, and other basic terms in geometry, as we shall see in the next chapter, are definable similarly. And such fundamental relations between the basic mathematical terms as serial order, as I have indicated in footnote eleven above, are definable in terms of logical relations, such as transitivity. In consequence, mathematics itself can be defined as a study of logical relations of logical relations, or, as a study of logical relations of classes of

[15] *Adventures of Ideas*, p. 197.

[16] *Possibility*, p. 193.

[17] *The Nature of Mathematics*, p. 144; italics in text. *Cf.* Morris R. Cohen, *Reason and Nature*, p. 185 *ff.*

[18] B. Russell, *Introduction to Mathematical Philosophy*, Chapter I, *et. seq.*

classes whose principles are defined by logical relations. Mathematics is an extensive study of complexes of logical relations.

Some may object that our doctrine of logical relations, together with our doctrine of internality, commits us to an infinite regress. If logical relations apply to items of fact of any sort, as we say, then, logical relations, being internal to fact, and, therefore, items of fact of a sort, are in logical relations. The hierarchy of logical relations spirals upward without end. This result, supposing it to follow, is, I believe, harmless. After all, some of the terms of this supposed infinite series are known, namely, the initial logical relations, and the principle of entry of the other possible terms, that each enters as a logical relation of logical relations immediately before it in the hierarchy, is at hand. The infinite serial whole satisfies the conditions of intelligibility regarding series, supposing it to exist. Some may object that a relational hierarchy which is infinite has no top. And in view of this, how can we say that reality has top principles, or first principles? The answer to this is that logical relations are a sub-species of the principle 'relation'. Even if they have no ceiling within themselves, they have a ceiling in a higher hierarchy under 'relation.' Their infinitude, supposing it to exist, exists within a more comprehensive whole. And on the level of this whole, wherein logi-

cal relations have a top, we say that there are top principles.

Logical relations, I say, apply to real items of any sort. Moreover, every item of any sort stands in some logical relation to any item of every sort. For instance, every item of any sort is a member of the whole of real items, identical with any item of every sort in this general respect. This point illustrates in most comprehensive fashion the point mentioned at the end of the previous section, that all items of the real stand in relations. In addition, it means that the universe of fact is to a certain extent organized as organicism conceives. Every item of the real is related to all other items in certain logical ways. This character of world-organization is important in any comprehensive view of the structure of the real, and naturally will recur when we deal with the whole of the real synoptically (Chapter VII).

Besides logical relations, the other two types to be considered are epistemological and ontological relations.

Epistemological relations do not apply to real items of every sort. In fact, they apply only to items of two sorts. There are just two types of epistemological relations: relations between the items composing knowledge, and relations between knowledge and its objects.

Some illustrations of the first type of epistemological relation are as follows: Sounds taken as data, as reports of fact, indicate or suggest the belief that a storm is approaching. A scientific generalization and certain established data imply the conclusion that an eclipse of the sun will occur or did occur at such and such a time. This concept is partially identical with that. These propositions imply those propositions, these judgments contradict those judgments. In brief, epistemological relations of the first type are relations between data, beliefs, ideas, generalizations, concepts, judgments, propositions, conclusions: items of knowledge entertained by knowing organisms. And they consist of such relations as conceptual implication, inductive indication, conceptual identity, judgmental contradiction, propositional implication, and so on.

Epistemological relations of the first type are logical relations in a special application. Knowledge has a dual status. It is a body of psychological content, a possession of certain continuants, namely, knowing organisms. And it is at the same time a body of reports about situations that have come within the attention range of knowers. Applying to items of any sort, logical relations apply to knowledge as psychological content and knowledge as cognitional reports. The epistemological relations of this first type are logical relations so specialized as solely to apply to items of

knowledge as reports. Ordinary textbooks, which define logic as the science of thought, study these relations from the normative standpoint. They attempt to state the special logical relations in which items of knowledge must stand to be valid reports of fact. They assume that to be a true report of fact, thought must at least reflect the logical structure of fact. And they describe this logical structure as thought must exhibit it to be valid as cognitional report.

The second sort of epistemological relation is between knowledge and its objects. Does knowledge correspond to its objects? Is it coherent with them? Is it partially identical with them? How is knowledge related to its objects? What are the relations knowledge has in the total cognitive situation? This is the issue here, and most so-called epistemological writings are explorations of the total cognitive context to settle some phase of this issue. The issue gives rise to the diverse theories of knowledge: realism, pragmatism, intuitionism, critical idealism, epistemological dualism, and so on. These are theories as to the way knowledge stands to the known. This second epistemological relation, like the first, is plainly of a special type, applying only to terms of a certain sort. One term always must be the knowledge of an organism, the other an item that has come within the attention range of an organism. This restricts the relation. Thus, a stone

and a table, although logically related, could not be said to stand to each other in this second epistemological relation. Neither is a bit of knowledge, *i.e.* a cognitional report. Hence, no relation in which the two stand to each other could be described as a relation of knowledge to a known.

The final type of relation is the ontological relation. Traditionally, relations have been classified as relations of ideas, and relations of matters of fact (Hume). Epistemological relations, at least epistemological relations of the first type, correspond to relations of ideas, ontological relations correspond to relations of matter of fact. The prime terms of matters of fact are events and continuants. Ontological relations as here understood, are primarily relations of events, of continuants, and of event-continuants.

Like knowledge, events and continuants have logical structure, since items of all types do. Within the all-inclusive logical structure, however, they have a special structure of their own. Consider causality. Properly viewed, causality is neither a logical nor an epistemological relation as above defined. It is not a logical relation, because it does not apply to items of every sort: *e.g.,* relations do not stand to each other as cause to effect. Indeed, as we shall see later, the only causes are events. Nor is causality an epistemological relation. Some have tried to identify causality with

epistemological determinism, but we shall find that this effort is not a success (Chapter V). Besides causality, examples of ontological relations are the material structure of continuants, the transitional structure of events, and the substantival structure of event-continuants. These have already been discussed. Other ontological relations of fundamental importance are space and time, mechanism and teleology, and such relations as that of mind to body.

In the next three chapters, I will discuss these latter relations. Since ontological relations are the relations *par excellence* of events and continuants, and, since relations are internal to their terms, special discussion of ontological relations should shed further light, not only on relations, but on events and continuants. Logical relations apply not only to events and continuants, but also and equally to every possession, component, combination, and relation of them. Epistemological relations apply merely to certain possessions of a few continuants, namely, knowing organisms, and to other items as standing in relation to these continuant possessions. Separate discussion of these other two types of relations, therefore, would shed no special light on events and continuants generally. The next chapters, however, will involve recurrent reference to logical and epistemological relations, enlarging and clarifying the preceding descrip-

tion. These chapters will introduce no new first principles, but, in making plainer the specific pattern of existence of events and continuants, they will enhance our grasp of the first principles set up, and will also lighten immensely the task of synopsis.

Knowledge and Existence, which includes all knowledge, dwell, then, within an all-pervasive logical structure. And each has a structure peculiar to its prime terms. The world is a logical whole, but far more complex in structural detail. The special structures mentioned are the epistemological and ontological relations. The all-pervasive logical structure is the field within which lies the subject-matter of general logic and, if certain interpretations are accepted, pure mathematics. The special existential or ontological structure is the field within which lies the subject-matter of all the sciences from physics to social science. The special epistemological structure, which exists in the results of all endeavors after knowledge, belongs to the subject-matter of epistemology. And the results of a study of first principles, as results of an endeavor after knowledge, should be considered as falling, along with the results of mathematics, physics, and the other sciences, within the field of epistemology. This last point, of course, does not mean that first philosophy, mathematics, *etc.,* are branches of epistemology, sub-sciences studying merely the special continuant possession which

is knowledge. They study different items. The point is that first philosophy, mathematics, *etc.* must have already reached results before an epistemology has proper subject-matter from which it could reach results. In particular, a first philosophy should precede an epistemology. This point is the answer to those descendants of Kant who demand that an epistemology be the first step in philosophy. As a science of knowledge, epistemology should study all bodies of knowledge, and this is not possible until knowledge in all its various other forms, including a study of first principles, has attained results, and offers something for study.

5. *Subjectivity.*

One more general question regarding relations deserves attention here. This is the semi-epistemological question, whether relations are items found by mind, or, items constructed by mind. Are relations subjective additions or discovered constituents of the real world? This is the problem of the subjectivity of relations.

Recent writers are divided on the issue. Following Hume and Kant, some writers hold that relations are the work of the mind, whilst others follow more ancient tradition and hold that relations are discovered constituents. Morris R. Cohen writes: "relations . . .

inhere in the natural world."[19] N. O. Lossky writes: nature's "systematic character is inherent in it and is not a merely subjective addition made by the human mind."[20] And A. N. Whitehead asserts that "the relations holding between natural entities are themselves natural entities, namely they are also factors of fact, there for sense-awareness."[21] On the other hand, Theodore Lipps writes: "we do not find them (relations) like bridges built between objects so that all we have to do is to get hold of them; . . . they are my acts of bracketing objects together, of grasping them simultaneously and holding them together. . . . Nothing can be related except through me; *i.e.* through my apperceiving self."[22] And Lawrence J. Henderson writes that the laws of nature "are exclusively rational. They are the product of human reason, and are not conceived by science to have objective existence in nature."[23]

Our position, that relation is a first principle, commits us to the general view that relations in their entirety are not derivative. Still, some local relations *qua* local may be derivative. Some local continuants *qua* local plainly are: *e.g.*, the offspring of organisms.

[19] *Reason and Nature*, p. 36.

[20] *The World As An Organic Whole*, pp. 24-5.

[21] *The Concept of Nature*, p. 14. William James and Samuel Alexander belong with Whitehead and the others on this point.

[22] *Einheiten und Relationen*, p. 1: quoted by Lossky, *Op. Cit.*, p. 25.

[23] *The Order of Nature*, p. 200.

I propose therefore briefly to review the types of relations enumerated in the previous section to determine how far the subjectivistic position regarding relations is justified.

Logical relations, I think, are not the product of any conscious mind. Unity and identity, for example, are conditions of consciousness. One could not be conscious of anything as an object, unless the anything already had some self-identity and unity. Similarly, inclusion. One could not be conscious of anything as an object unless it already existed in the relation of inclusion in the world of objects. In general, logical relations appear to be structures in which objects must exist if consciousness is to come upon them as objects, and, therefore, they cannot be said to be derived as after-products from consciousness. To be sure, one might hold that such logical relations as unity, are after-products of a concealed unconscious mind, manufactured or lying ready in a dark chamber of the soul and projected into objects as conditions of ordinary consciousness. Kant, who held a view similar to this, applied it mainly to ontological relations, and I shall examine his reasons for holding it in connexion with discussion of ontological relations later. So far as logical relations proper go, however, we may say at once that the supposition of such a mind is of no avail. Indeed, Kant could not say what he meant by this

mind if he did not suppose it to have at least some self-identity and some inclusion in the world of real items. To be said to be anything which could create anything, this mind would have to be supposed already to be in logical relations, before it began to create them.

A fairly good case for subjectivism of a sort, however, might be made regarding some epistemological relations. Consider the particular relation between concept A and its contents m, n, o, as they stand in the mind of investigator M. Concept A, the concept of some new chemical compound, let us say, is a bit of knowledge, and m, n, o, are items of information stowed away in the concept by this investigator's mind in examining and analyzing instances. That concept A in this person's mind should include m, n, o, and not x, y, z, appears plainly to be the result of the activity of this mind operating on the instances. This local epistemological inclusion, as distinct from inclusion in general, or, logical inclusion properly so-called, appears to be dependent on this mental effort.

The formulae of the natural sciences are examples of epistemological structures which might be said to be the work of the mind. Customarily, these formulae represent general ontological and logical relations which are discovered in nature. But they themselves are local structures which are produced by cognitive continuants investigating nature. And the fact that

these formulae have to be overhauled, modified, replaced, as human insight into natural fact develops, testifies to their mind-dependence. Hence, there is truth in Henderson's remark quoted above. The laws of natural science have not objective existence in physical nature, provided one means by such laws the generalizations which natural scientists make about the relational patterns in nature. Such generalizations, or formulae, are local structures constructed by minds investigating natural fact, and they depend for their particular lay-out on the insight and interpretative responses which these minds display in investigating this fact.

As to ontological relations, the correct answer is, I think, that, like logical relations, they are discovered, not made, by the knowing mind. They are original, not mind-injected. This position will be argued in the next chapter where, in the discussion of space and time, we shall have occasion to consider the sort of reasons traditionally offered for holding that ontological relations are additions by mind. We shall see, I think, that these reasons are insufficient to carry the subjectivistic position, and that the alternative position is much more adequate, and much more convincing.

So much at present for the question of subjectivity. The knowing mind is creative, we should allow. But its knowing activity is creative of knowledge and particular local structures in knowledge, not of structures

more general, such as the logical and ontological relations.

A few words should be added here about the ontological relations to be discussed in the next three chapters. The ontological relations previously discussed, such as the material form of continuants and the substantival connexion within event-continuants, are immanent structures of our prime world terms. The ontological relations now to be discussed, space and time, causality and teleology, are the characteristic transeunt structures of these prime terms. The next three chapters will consider these ontological relations in this light, passing by detailed questions that would lead from this path. We shall study these ontological relations insofar as they help to bring out more clearly the peculiar intra-existential pattern in events, in continuants, and in event-continuants, and thus help to set these prime realities more fully before us in their complex transeunt unity. The two final chapters will build considerably upon these fundamental developments. But they will also re-assemble the structural elements unstressed in the three chapters to follow, chiefly the logical relations, and they will sketch the fuller organization as well as the pervasive nature of the real, the transeunt existential structure of whose prime terms will now be the principal immediate object of investigation.

CHAPTER IV

Space and Time

1. *Relational Theory.*

Space and time are relations of matters of fact. This relational theory contrasts with the absolutistic theory in science, the substance theory in philosophy. First, let us glance at these contrasting theories.

The absolutistic theory holds that space is an infinite, immovable, continuous, homogeneous, box-like whole, which is absolutely independent of the matter which occupies it; that time is a continuous, uniform, eternal flux, which is absolutely independent of the events which occur in it. "Time could have existed without Space or Matter; Space could not have existed without Time, but it could have existed without Matter."[1] And both are "entirely independent of any sensible object or motion by which we try to measure them; time flowing equably from eternity to eternity; space existing all at once in infinite immovability."[2]

Science has parted company with the absolutistic theory of space and time. Lacking the support of

[1] C. D. Broad, *Scientific Thought,* p. 88.
[2] E. A. Burtt, *Metaphysical Foundations of Modern Science,* p. 246.

physical experience, which never presents space or time absolutely independent of events and things,[3] the justification of the theory has always rested on non-physical grounds. In Newton, these were partly theological, partly mathematical. The theological support has been shorn away long ago,[4] so that to-day "Absolute Space, Time . . . have all the appearance of being mathematical devices."[5] As such, they are no longer needed. The new scientific understanding of nature employs a new set of mathematical instruments, which imply a new theoretical outlook. Summing up this outlook, C. D. Broad writes: "We have long ago dropped the notion that a Space-Time is a kind of empty warehouse, with various cellars ready to receive different materials. . . . Our view is that a Space-Time is a characteristic form of relational unity which pervades a whole set of entities, and binds them together into a particular kind of complex whole."[6] In science, the relational theory of space and time has triumphed completely over its rival.

In philosophy, the substance theory, which is the

[3] Nor are Absolute Space and Time a necessary part of the theoretic apparatus required for determination of the empirical, as distinct from the mathematical, laws of motion, or for making empirical measurements. C. D. Broad, *Scientific Thought*, p. 112 *ff*. In sum, the absolutistic theory, as A. N. Whitehead, *Concept of Nature*, p. 37, writes, "does not seem to correspond to anything in our experience."

[4] Burtt, *op. cit.*, p. 256 *ff*. explains this point at length.

[5] Broad, *op. cit.*, p. 113.

[6] Broad, *op. cit.*, p. 544.

rival here of the relational theory, goes back to Descartes, and is held by contemporary philosophers, such as Henri Bergson and Samuel Alexander. Descartes held that extension, or the space of physical science, is physical substance, and physical substance extension. Bergson holds that *durée* is a creative impulsion from which all things have evolved.[7] Alexander conceives space-time as the substance or generative stuff, from which matter, life, mind have arisen.[8] Such views of space and time, I believe, are unacceptable as philosophy, even when substance is conceived as substantive, not as x-substratum, which, as we have already seen, would be decisive against the substance theory wherever employed.

Descartes' view that space or extension is matter, or, the essence of material substance, has been under criticism since formulation. In its day, this view was a useful simplification, facilitating a mathematical science of physical nature. As methodology, it had merits. As a philosophical analysis, it left much to be desired. To-day, mass and energy are held by some to be more essential in matter than space or extension.[9] Space, it

[7] *Creative Evolution,* Chap. 3.
[8] *Space, Time, Deity,* I, p. 164 *ff*.
[9] A. N. Whitehead, *Adventures of Ideas,* pp. 237-8: "The science of physics conceives a natural occasion as a locus of energy. Whatever else that occasion may be, it is an individual fact harboring that energy." On Einstein's theory of the equivalence of mass and energy, see, for example, Hans Reichenbach, *Atom and Cosmos.*

may be allowed, is an essential. But a material thing is far richer than the mere space which is there. Besides space, material things exhibit mass, inertia, density, energy, gravity, essentials which are not just space. Accordingly, the Cartesian theory of extension or space as the entire essence and equivalent of material substance, seems indefensible, both as a theory of space, and as a theory of the essence of a material substantive.

Bergson's theory that *durée* is a creative impulsion, agrees with our views, if *durée* means change. If *durée* means time, the theory does not, and I think it is erroneous. Of course, if you decide to make time mean change, time is a creative substantive. But then you will have to invent a word for time in its ordinary sense, and matters will be just where they were before you started. As ordinarily understood, change requires time, but a change is not just the time it takes to happen: *e.g.*, an automobile accident, a change, is not just the time it takes to happen. I assume that "the philosopher's business is," as C. J. Ducasse says, "not to make over language where it is already clearly and definitely made, but only to make its meaning fully explicit, and to complete it where it is as yet incomplete." [10] On this assumption, change is not time, although it involves time. Moreover, it is change, not

[10] *Causation and The Types of Necessity*, p. 27.

time, which is the substantive. As A. N. Whitehead writes: "the attempt to set up time as an independent terminus for knowledge is like the effort to find substance in a shadow. There is time, because there are happenings."[11] The substantives are the changes or the happenings. The time they take is merely one element in the being of these substantives, as space is in the being of material reality.

Alexander conceives space-time as a stuff to which all concrete fact is reducible without remainder. To re-quote: "each new type of existence when it emerges (matter, life, mind) is expressible completely and without residue in terms of the lower stage (space-time, matter, life), and therefore indirectly in terms of all lower stages."[12] Mere space-time, the lowest stage, is conceived as the original matrix of all the others. This theory, that all being emerged in the past from mere space-time, as we saw in our second chapter, is an insecure conjecture. Moreover, whether mere space-time is now the exhaustive 'substance' of the universe, or not, is an independent matter, and wholly a question of current evidence. On this plane, the answer must be the same as in the separate cases of space and time. The 'substance' of the universe is far thicker. Indeed, mere space-time without remainder is nowhere to be

[11] *The Concept of Nature*, p. 66.
[12] *Space, Time, Deity*, II, p. 67; parentheses mine.

found. Everywhere space-time is merely one complex element in substantival fact as we find it, no more exhaustive of it, and no more equivalent or essential to it, than many other elements, such as mass, energy, gravity, density, and so on.

Space and time, then, we may grant, are essentials in the universe. But they are not equal without remainder to the things and events of the universe, its substantival fact, as Descartes, Bergson, and Alexander, to various extents, have held. Our affirmation that space and time enter into the being of the substantives of fact is in accordance with the internality principle previously described. Our denial that space and time are the substantives of fact is the negative side of the relational theory which I wish now to describe in positive terms.

Sometimes, the relational theory is described as the view that "Space and Time are nothing but systems of relations between entities which are not themselves intrinsically spatio-temporal,"[13] between mathematical points, *etc.* This is the logico-mathematical version of the relational theory, of which more later. The version of the relational theory I wish primarily to uphold is considerably different. This is that space and time are basically relations of events and continuants, entities which are intrinsically spatio-temporal. In over-

[13] S. Alexander, *op. cit.*, I, p. 168.

simplified version, our doctrine is this, that time is the sequential order in events, space the extensional structure in continuants, and space-time the extensional-sequential form in event-continuants. I will call this an existential or ontological, as distinct from a mathematical, theory of space and time.

Of well-known views, our theory probably has closest affinity to a doctrine in Kant's writings. A noted scholar of Kant's first *Critique*, expressing his own position, writes: "Time and space, whatever else they may likewise be, are relational forms of existence. . . . While each is unique in its kind, they (space and time) *integrate* with one another and with all existing things and events." "They (space and time) are not contents, but only forms for the organization of contents highly variable in their characters." [14] Kant's own views of space and time are not easy to state. Kant felt a distinction between mathematical space and time, and existential space and time, but never felt clearly its significance. In the first *Critique*, he is officially discussing the space and time of pure geometry and mathematical physics. Actually, however, he presents two theories of space and time, a mathematical and an ontological. At the same time, he does not seem to realize that the two are separate. Kant's theory of

[14] N. K. Smith, *Prolegomena To An Idealist Theory of Knowledge*, pp. 155-6, p. 187; italics in text; parenthesis mine.

mathematical space and time, that space and time are pure *a priori* intuitions completely independent of all sensible phenomena, is held by most writers on the foundations of mathematics to be logically useless as well as psychologically mythical. Kant's ontological theory, which interprets space and time not as pure wholes existing independent of all sensible phenomena, but simply as universal perceptual forms of sensible phenomena, is another story.

In two fundamental respects, this theory agrees with our own view of space and time. First, it holds that space and time are not independent substantives, but forms, structural elements. Second, it holds that space and time are simply forms of matters of fact. These tenets are foundational in our version of the relational theory. In one fundamental respect, however, Kant's ontological theory differs entirely from our own, and, if I may say so, from commensense. Kant holds that space and time are mental, gifts of mind to nature. I wish briefly to examine Kant's reasons for this position, reasons used by Kant in declaring other ontological relations, such as causality, also subjective in origin.

Clearly, Kant's position is not based on observation. No one has ever observed any mind injecting space and time into concrete matters of fact. At the start, the objective is a field, an already formed manifold. I

believe this is also Kant's position, since he holds that the sole objects of conscious observation are appearances, or, materials already organized spatio-temporally. Doubtless, psychological theory figured in Kant's subjectivism. Kant was entangled in the atomistic psychology of classic empiricism, which held that the items entering experience are in themselves discrete or relationless bits. This atomism certainly influenced Kant in taking the position that relations are subjective additions. I believe, however, that Kant's main arguments for subjectivism are transcendental, not psychological,[15] *viz.* the following three. First, subjectivity is required to guarantee to geometry and pure mathematics the validity they have for natural objects. Second, space and time are universal and necessary, and whatever is universal and necessary, is mental. Third, space and time, if taken as non-mental, give rise to contradictions, or antinomies.

The third argument need not detain us. It is now recognized generally, I believe, that Kant did not prove that space and time, if taken as non-mental, give rise to contradictions, or, antinomies. Kant's proofs, as Norman Smith writes, "are in all cases inconclusive."[16] Nor does Kant's first argument hit the mark. The

[15] N. K. Smith, *Commentary,* pp. 87-8, gives criticisms of such arguments as rest on psychological atomism.

[16] *Commentary,* p. 483. Pages 483-8 contain a meticulous examination of Kant's proofs.

subjectivity of space and time are unnecessary to guarantee to mathematics the validity it has for natural objects. This subjectivity might be required if mathematics were a body of propositions necessarily valid of all ordinary matters of fact *a priori,* as Kant appeared to believe. But mathematics, including Euclidean geometry, which was Kant's paragon of valid mathematics, it is now recognized, has only probability, not necessity, in regard to ordinary matters of fact. Moreover, this probability is explicable not because the form of mind is *a priori* the form of nature, but more because it is not, and some initial gulf of a formal type stands between knower and the known.[17]

As to the second argument, that space and time, being universal and necessary, are therefore mental, this is valid if whatever is universal and necessary, is necessarily mental. Kant himself, however, has given us grounds for disbelieving this. Kant holds that all objects whatsoever must have sensory content. They must have matter as well as form. This is a universal prerequisite, if objects are to appear. Yet the matter of objects, Kant also holds, is not derived from the mind. It is supplied to the mind in experience. In

[17] See my articles, *Uniformity and Induction, Journal of Philosophy,* March 1932, p. 141 *ff.* and *The A Priori, Journal of Philosophy,* May 1933, p. 253 *ff.* *Cf.* Cohen, *Reason and Nature,* Chapter 5. See next section, toward the end. That the pluralism implied in our criticism here is not radical or atomistic is made clear in our seventh chapter.

general, there is no necessary connexion between universal and necessary, and derived from the mind.[18] Thus, logical relations, such as identity and inclusion, are universal and necessary both for minds and for objects. A must be A, and included in the items of the real, to be anything real, mind or object. Thus, we might say, logical relations, such as identity and inclusion, are universal and necessary for any mind to be anything. As presupposed by every mind, these relations cannot be held to be mere after-products derived from a mind. Universal and necessary, and derived from mind, are not equivalents.

I conclude that space and time are not only forms of matters of fact, as Kant held, but that they are original, not mentally derived forms, as commonsense holds. Things not only *appear* in space and time, they originally and really are in space and time. None of the Kantian arguments is strong enough to demand that one alter the ordinary conception, and consider space and time as mental productions injected into the offerings of things originally without them.

This completes the general statement of our philosophy of space and time. It remains to expand and clarify it by further analysis. I propose to do this by discussion of the so-called types of space and time:

[18] See my article, *The A Priori, Journal of Philosophy,* May 1933, p. 253 *ff*.

psychological, physical, mathematical. This discussion will require an elementary excursion into psychology, physics, and the foundations of mathematics.

2. *Types of Space.*

I will discuss, in sequence, so-called psychological, physical, and mathematical space.

Psychological space is any volume of total space which any percipient apprehends at any moment of his conscious experience. Sometimes, this space is called perceptual space, and sometimes, private space. The reason is not that the space belongs to the percipient, for it does not. It belongs to the whole ensemble of entities ordered in it. The reason is that each instance of this space as chosen by the percipient has boundaries which shift with the percipient's attention. In addition, the spatial properties and directions assigned to entities here are assigned from the locus of the percipient's body. In my private space, the window I see over my right shoulder is nearby, to the right, above and behind, whilst in the private space of the man on yonder hill, the window is remote, to the left, below and in front. In private space generally, spatial properties, such as nearness and remoteness, and spatial directions, such as up-down, right-left, front-back, are through and through relative, being determined from each percipient's body. Psychological

space is sensibly continuous; no rift or break is discernible within it. Finally, every psychological space is finite, being a momentary, limited, private, and rather ragged-edged selection from a larger whole.[19]

Physical space is total space, the larger whole from which psychological space is a momentary selection. Containing the ensemble of continuants, total space is properly called physical, since all continuants are physical. In addition, total space is the world-space studied by physics.

The relativity present in private space is equally present in public or physical space. Spatial properties, such as nearness and remoteness, and spatial directions such as right-left, east-west, are relative here, as there. The main difference is the base from which the properties and directions are assigned. In private space, relativity means relative to the percipient's body. In public or physical space, any body may be the locus from which spatial properties and directions are assigned. Relativity in public space is generalized. It is also quantified. Consider position. In physical science, position is determined by choosing a reference body, erecting in it a Cartesian co-ordinate system, and determining from the origin of the Cartesian system, the

[19] N. K. Smith, *Idealist Theory of Knowledge,* p. 84, p. 139. S. Alexander, *Space, Time, Deity,* I, p. 147. C. D. Broad, *Scientific Thought,* p. 34. A. N. Whitehead, *Concept of Nature,* pp. 49-52.

x, y, z, values of the body whose position is in question. The reference body may be any body you like, the earth, your organism, the fixed stars. There is no restriction. The x, y, z, values assigned will vary with the chosen reference body, but all values will be correct, relative to this chosen frame.

Quantitative values are not only relative to the spatial co-ordinates of the chosen frames. Recent physical theory holds that these values are relative also to the motion of the chosen frames. A distance, or spatial interval, for example, will have one value measured from a frame at rest and a different value measured from a frame in uniform rectilinear motion relative to its two separated end-points, and both values will be correct. The reason is that the measurement of spatial interval involves a judgment of simultaneity, namely, that the two points are being taken at the same time. This is possible for widely separated points, however, only by means of light signals. But, if a reference frame is at rest relative to the separated points, as is a railway embankment on which the points are marked off, light signals there will be judged simultaneous which will be judged successive from a body in uniform rectilinear motion in respect to the points, *e.g.*, a train moving along the embankment. As a consequence, the spatial interval here cut off in a moving reference body by signals simultaneous in it, will be

shortened in the direction of its motion. And since light is assumed to have an absolute velocity for all frames, no correction of this shortening is permissible.[20]

These and similar quantitative relativities have been brought out by the recent Relativity Theory. In its so-called special form, this theory assumes the constancy of the velocity of light and sets up transformation formulae such that the space and time values that are found from one reference frame will permit calculation of the space and time values that would be found from any other reference frame in uniform retilinear motion relative to the first frame. Given the specified motion, these reference frames are perfectly general; at least, they are not limited to the percipient's body.

Current physics renders debatable many mathematical properties traditionally assigned to physical space, *e.g.*, that physical space is mathematically uniform and continuous, geometrically infinite and Euclidean. Some mathematical physicists still assign some of these properties to physical space. For instance, A. N. Whitehead holds that physical space is uniform and Euclidean.[21] But there is no unanimity. Einstein, for instance, assumes that physical space is

[20] Albert Einstein, *Relativity*, Eng. trans., Part I.

[21] Whitehead, *Principle of Relativity*, p. vii.

not strictly Euclidean, and uses a non-Euclidean geometry in his General Theory of Relativity. He also holds that physical space is non-uniform, varying with the distribution of matter in a region. In addition, Einstein has suggested that physical space may be finite. And recent quantum mechanics suggests that physical space may be mathematically discontinuous, *e.g.*, it conceives the quantum as a hard 'lump', and not as infinitely divisible.

The questions at issue here are, I think, physico-mathematical, not philosophical. Their decision rests upon the compulsion of further physical evidence and additional mathematical speculation, not upon one's general philosophy of space. Thus, a relational theory of space, such as already stated, is, I think, entirely compatible with physical space being Euclidean or non-Euclidean, mathematically finite or infinite, mathematically uniform or non-uniform, mathematically infinitely divisible or finitely divisible. These mathematical properties can be interpreted by it simply as some of the possible detailed specifications that the relational structure which is space, may or may not possess. Does this relational structure possess any of these mathematical properties? The philosophical theory that space is a relational structure clearly does not decide.

Nor are the questions here dialectical. There is no

internal contradiction in the assertion that physical space has any one of the above mathematical properties. Alleged contradictions have been found in ascription of finitude and infinitude to space. Kant supposed it contradictory to say that space is infinite, because a successive synthesis *ad infinitum* seems required to conceive infinite space, and such synthesis is not humanly possible. Popular thought declares the notion of finite space contradictory, because in picturing the whole of space as finite, it is always forced to picture it with an outside space, which means in its view that the whole of space cannot be conceived as finite. Such views, however, clearly confuse manufacturing an intuitive image of space with having a mathematical concept of it. The two are quite different. Thus, to have a mathematical concept of infinite space, which is all that conceiving such space can mean here, requires, not the endlessly manufacturing of an intuitive picture of voluminousness, a rather senseless task, but merely understanding the mathematical principle which an infinite space would obey. And this is attained simply by an unambiguous description, or definition, of space and infinity, such as is now available in philosophical and mathematical literature. Similarly, with finite space. There is no need to manufacture any psychic pictures. In such mathematical matters, as in many others, picture-thinking is not only unneces-

sary, but misleading, and once relinquished, the alleged contradictions it generates, vanish into thin air.[22]

Finally, mathematical space. Physical space is the extensional structure of individual events and continuants, to which certain mathematical properties apply; it is space as an ontological principle of world-order. Mathematical space is not a concrete extensional order, but an abstract logical system. In the ordinary sense of the word, mathematical space is not a space at all. Mathematical space is a logical structure of points, lines, planes, areas, and volumes. The basic element is the point. But a point is not, as one imagines, a tiny area or volume of physical space. "Euclid has expressed for all time the general idea of a point, as being without parts and without magnitude."[23] That is, a mathematical point is an entity without spread or spatiality, as ordinarily understood. Mathematical lines, planes, areas, and volumes, are resolvable into diverse logical systems of mathematical points. Thus, mathematical space as a whole might be described as a complex logical system of terms which

[22] On the inadequacy of sensation, and of picture-thinking which merely reproduces elements of sensation, to express all fact, particularly mathematical and moral fact, see Chapter VIII, and also the ensuing discussions of mathematical space and time. In philosophy, this inadequacy has been recognized since the days of Plato, who was a mathematician and moralist. It was also emphasized considerably by creative mathematicians, such as Descartes and Leibniz.

[23] Whitehead, *Concept of Nature*, pp. 85-6.

are really not at all spatial in the ordinary sense of the word.

Completely different from physical space, the space of pure mathematics is sometimes interpreted as a purely subjective fiction. There is no need to do this. It can be interpreted as moored in physical reality. One method of defining this space, to show this mooring, is A. N. Whitehead's Method of Extensive Abstraction.[24] In few words, the Method is this. To define a point, it begins by selecting concentric volumes of physical space which are conceived to form a class, or series, such that each member encloses some other member and is itself enclosed by some other member. The whole series or class of volumes is called an abstractive set. The Method then defines a point, not as the limit of the set, but as the set itself, or, more accurately, as "the class of all the volumes in any of the series that would commonly be said to converge to the point."[25] Lines can be defined in terms of points, or, by selecting different initial enclosure volumes. Planes *etc.* likewise. It should be noted that abstractive sets are infinite series toward their small ends.[26] And it should be emphasized that a point, instead of a limit of an abstractive set, is really a class of such sets. That

[24] Whitehead, *The Principles of Natural Knowledge,* Part III.

[25] C. D. Broad, *Scientific Thought,* p. 45. On pages 46-7, Broad defends this definition against possible charge of circularity.

[26] A. N. Whitehead, *Concept of Nature,* pp. 81-2.

is, a point is a class of classes, and definable by the same logical principle as number, namely, the principle of class inclusion.[27]

Mathematical space is a system of elements ideal for formulation in simple terms of laws of mathematical physics.[28] Unlike physical space, mathematical space may be described unreservedly as a mathematical continuum. Hence, it possesses an assured one-to-one correspondence with the continuum of real numbers, and an ideally precise quantitative value is assignable to every point of it. By conceiving mathematical space as a logical system of strictly logical terms, the Method of Extensive Abstraction retains this ideal simplicity and purity. At the same time, as I say, the Method moors mathematical space in physical reality. The mathematical point, for example, is defined as a class of series many of whose members have a very palpable physical existence and the remainder of whose members, *e.g.*, the infinite members toward the small subperceptual end of the series, are definable in terms of logical relations to these palpable physical existents. Hence, whilst suitably ideal for purposes of pure mathematics, the point is moored here in perceptual

[27] B. Russell, *Introduction to Mathematical Philosophy*, Chapter I *et seq.* See Chapter III, Section 4, above.

[28] C. D. Broad, *Scientific Thought*, p. 56: "The laws of Mechanics are only simple when they state relations between momentary configurations of one set of (unextended) particles and a later or earlier configuration of the same or another set of particles." Parenthesis mine.

physical reality. It is not wholly high and dry in the ether of pure abstraction.

Even on this interpretation, however, mathematical space remains, as I say, a purely logical system. It is a system of logical relations between terms such as points which are themselves logical relational systems. Broad writes: "Points *etc.* as defined by us are not fictions; they are not made by our minds, but discovered by them. . . . On the other hand, they do not exist in precisely the same sense in which finite volumes exist. They are real in their own kind, but it is a different kind from that of volumes. It is through no mere accidental limitation of our senses that we cannot perceive the points and straight lines of the geometers. . . . Only particulars can be perceived by the senses; and points are not particulars. They are classes of series of volumes, or, to be more accurate, are the logical sum of such classes. . . . They exist in the sense that they are determinate functions of real series of actually existing particulars."[29] That is, points exist as logical entities, and mathematical space exists as a relational system of logical entities.

One implication of the logical character of mathematical space is worth special attention. When propositions about mathematical space are applied to physical existence, when extended particles are taken as points,

[29] C. D. Broad, *Scientific Thought*, p. 51.

light-rays as lines, *etc.*, something of the refinement and certainty of pure mathematical thought will necessarily be lost in the process. This misfortune is not circumvented even by the Method of Extensive Abstraction. For example, particular continuants are not logical sums. And no physical particular is ever found actually to contain more than a cross-section, or approximation, of an infinite series of enclosure volumes, classes of which define for this Method such entities as mathematical points and lines. In consequence, many propositions about the properties of mathematical points and lines will be found to have at best only approximate exemplification in physical existence. They will not apply precisely. Some propositions will be exemplified. General logical relations, as we have seen, apply to physical particulars as well as to mathematical lines and points, so that a duplicate set of logical relations is bound to hold for both. The mathematical laws of addition and equality, for instance, are exemplified by apples added together, no less than by line-segments added together. But many mathematical propositions about mathematical line-segments, even supposing them as defined by the Method of Extensive Abstraction, will not be found to apply to physical nature precisely, and some not at all, because no physical particular is ever found to be more than an approximation to the infinite enclosure series to

which such findings, according to the Method, completely and precisely apply.

In general, there is considerable doubt concerning the certainty of any theorem of pure mathematics when applied to physical particulars. Albert Einstein, who uses non-euclidean geometry in his physical theory, sums up the best current opinion on this matter as follows: "As far as the laws of mathematics refer to (physical) reality they are not certain, and in so far as they are certain they do not refer to (physical) reality."[30] Thus, by means of such systems as mathematical space, the mathematical physicist can attain statement of laws of ideal simplicity, but only to substitute physical particulars such as extended particles and light rays for his terms, and have observable nature fail to verify his laws with ideal completeness.[31] Applied mathematics, descending here from the realm of pure logic to the realm of particular matters of fact, is like the philosopher returning into Plato's Cave. It wanders uncertainly, finding that physical particulars are crude images of its logical system, and that many possibilities discernible in the purely logical realm are

[30] *Sidelights on Relativity*, p. 28; parentheses mine.

[31] See my article, *Uniformity and Induction, Journal of Philosophy*, March 1932, p. 141 *ff*. In contrast to Kant's belief in the apodictic certainty of the mathematical laws of pure physics, the current belief is that the mathematical laws of pure physics are hypothetical and approximate probabilities about nature. They are, as Plato held, likely stories. This view agrees completely with our view of the result of applying pure mathematics to concrete matters of natural fact.

exemplified unprecisely, or not at all, by the sense-items of the shadow arena.[32] There is a difference between the purely logical and the ontological.

I will conclude with a brief comparison between physical and mathematical space. Both spaces are relational structures, both are through and through relative. But the differences are more striking. Physical space is three-dimensional, mathematical space is n-dimensional. Physical space has for relata ontological matters of fact, particular events and continuants. Mathematical space has for relata such entities as points and lines which are not ontological matters of fact, or spatial in the ordinary sense of the word. Physical space is world-space, the concrete extensional order of the prime world-facts. Mathematical space is a logical structure which retains the name of space, because its terms can be defined so that they are moored to spatial reals, and because its laws are exemplified in varying degrees of approximation by spatial physical reals. In the ordinary sense, however, mathematical space is not a space at all. Intrinsically, it is much more like the continuum of real numbers, which is, according to Ernst Cassirer, "the only continuum with which he (the mathematician) is acquainted (and to which he attempts to reduce all the others)." [33]

[32] M. R. Cohen, *Reason and Nature,* Chapter 5.

[33] J. A. Gunn, *Problem of Time,* p. 226; first parenthesis mine.

3. *Types of Time.*

I will discuss, in sequence, so-called psychological, physical, and mathematical time.

Psychological time is private time, the sequential order of events as colored up by multiple psychological and private factors. The simplest unit of psychological time is the so-called specious present. This present is a real time, not a mathematical moment, or a logical instant. It possesses temporal spread and succession, a before and an after. And if a mathematical moment be conceived as a present dividing, like a knife-edge, past and future, the specious present would have to be conceived as containing, besides something of the present, something of the past and something of the future.[34] Hence, the name, specious present, which is itself specious in a sense. Specious presents are specious if the present be conceived as a mathematical moment, but they are not specious but real times, genuine specimens of sequential order, which incidentally mathematical moments are not.

Psychological time is called private time, not because it belongs to the intra-organic events of percipients, so-called enjoyed events. Observed as well as enjoyed events may enter psychological time. This time is called private because magnitude of duration, and spe-

[34] G. Santayana, *Realm of Matter*, p. 71: "there is . . . a virtual possession of the past and even of the future."

cific order and direction, are here assigned events on the basis of private factors in the experience of the various percipients. For instance, the event, person waiting in a railway station, may seem very short as reckoned by a ticket agent observing it, but ages long as reckoned by the person 'enjoying' it. In general, the amount of duration privately assigned events is relative to anxiety, interest, attention, and similar private factors.

Direction is also relative. A person intensely interested in a sound will hear as later a second sound which occurred simultaneous with the first sound without disrupting the attention of the percipient. The temporal direction of the two sounds, which is before, which is after, in private time will vary with the attention and interest of percipients. 'Now' and 'then' are also relative. In private time, 'now' is applied to any event whose duration is taken as overlapping the specious present of the organism assigning the 'now': 'then' is any event whose duration is not taken to do this. In short, private time is as through and through relative to the individual percipient, as private space. There is this difference. In private space, spatial properties and directions are assigned to bodies, relative to the percipient body. In private time, temporal properties and directions are assigned to events, relative to

the percipient event, which is the organic experience of the other events.

Physical time is public time, the sequential order of events without the purely private colorings of experients. Every event exhibits sequential order in itself and stands to other events in sequential order. This total sequential order extending publically to all events, is physical time. This time is called physical, because all events are continuant events, and continuants are always physical. In addition, public time is the world-time studied metrically by physics.

A simple analysis of the physical sequential order is into past, present, and future. This analysis may be given a restricted causal interpretation. According to this, the center of the sequential structure is the present. Events exist in the present. They are going on there. No event in the present, however, stands alone. Doubtless, the present's "chief reference is to the emergent event, that is, to the occurrence of something which is more than the processes that have led up to it and which . . . adds to later passages a content they would not otherwise have possessed."[35] But there are the processes that have led up to the emergent event, and the content that is added. The present is tied causally to something which precedes, and to something which succeeds. It is within a causal progression, which in-

[35] G. H. Mead, *Philosophy of Present*, p. 23.

volves as real, relative to any present, both antecedents and consequences, past and future. Thus, starting with the present, we discover by means of causation meaning and reality in both past and future.

The causal interpretation of past-present-future is a restricted version of the physical sequential order. Succession is a wider principle than causation. An immediately past event, for example, is succeeded not merely by its present consequence, but also by many events which are now future and not its causal consequence. And a future event is preceded not merely by its present ancestor, but by all the events of the past, which are, of course, not ancestors in the present. Causation secures to any single present event an antecedent and a consequence. But there are many events besides the given present event which succeed this present's causal antecedent, and many events besides the given present event which precede this present's causal consequence. I am stating here an aspect of the general doctrine that mere succession is a wider principle than causation. This general doctrine is foundational to proper understanding of causation, as we shall see. It is also re-affirmed by current physical interpretations of the temporal structure.

Physical space is a tri-partite extensional order, with length, breadth, depth. Physical time is a tri-partite sequential order, with past, present, future. Past and

future are relative to present. Yet it is also true in a sense that every present event is also past and future. McTaggart holds this to be contradictory. Past, present, and future, are incompatible characteristics, which exclude each other, yet, according to the foregoing, a present event has all three. The answer to this is that when past and future are assigned to a present event, they are assigned relative to different present events. More exactly, B, which is present, is said to be past when C, which is future to B, is, or is considered to be, present. And B, which is present, is said to be future when A, which is past to B, is, or is considered to be, present.[36] Past and future, as I have said, are relative to present. And "contradictory epithets of this sort (past, future) are compatible," as Santayana says, "when they are seen to be relative."[37] R. B. Braithwaite writes: "The assertion that Queen Anne's death is present, past, and future is false whenever it is made, yet Bolingbroke, George III and William III might all have been speaking the truth if they had said that it was present, past, and future respectively. . . . 'Present', 'past', and 'future' are words like 'this' with different meanings whenever they are employed."[38]

[36] See my article, *McTaggart on Time, Mind,* Jan. 1930, p. 26 *ff.* which examines McTaggart's arguments with some completeness. *Cf.* C. D. Broad, *Scientific Thought,* p. 79 *ff.* G. W. Cunningham, *The Idealist Argument,* p. 501 *ff.*

[37] *Realm of Matter,* pp. 72-3; parenthesis mine.

[38] *Time and Change, Aris. Soc. Supp. Vol.* 8, 1928, p. 168.

So far, I have described the nexus past-present-future as a sequential order in which a present event stands to others past and future. Recent physical theory describes how, for purposes of available physical measurement, past-present-future as a world-wide nexus must be construed. In private time, a specious present may be taken as an absolute from which the pastness, presentness, or futurity of all other events in the percipient's time may be determined. In physical time, according to recent theory, there exists no one absolute physical present, embracing all events rightly reckoned contemporary, and allowing absolute metric determination of all other events as past or future. A pair of events may be simultaneously present as measured from a given reference body, but measured from a body in uniform rectilinear motion relative to the first body, they will be reckoned successive, past and future to each other, unless the pair happen both at the same place and at the same date with respect to the original or some such body. C. D. Broad writes:[39] "a pair of events which are simultaneous with respect to a certain platform, and are separated in space with respect to that platform, will be successive with respect to any platform that moves relatively to the first, and the time-lapse between them with respect to the second platform will depend on the spatial separation of the two events. It is only

[39] *Scientific Thought,* pp. 147-8.

pairs of events that happen *both* at the same place and at the same date with respect to *some* platform which will happen at the same place and date with respect to *all* platforms that move with uniform rectilinear velocities relative to the first. A pair of contemporary events, which occupy different places with respect to the platform in which they are contemporary, will be successive in all other platforms that move relatively to the first." A. N. Whitehead writes: "If A and B are co-present there will be some systems in which A precedes B and some in which B precedes A. Also there can be no velocity quick enough to carry a material particle from A to B or from B to A."[40]

The relativity of the physical world-wide present is connected with relativity of temporal interval, or, lapse,

[40] *Concept of Nature,* p. 177. The second proposition of this quotation has, I think, considerable importance. As I take it, it means not merely that A and B are spatially separated, but that A and B are causally independent. It affirms that co-present (and with the first proposition, successive) events which are spatially separated, are never cause and effect to each other. Taken with the first proposition, the second has also two other important implications. First, since causation involves events and succession, and A and B, though successive events, are non-causal, succession is wider than causation. This point has already been emphasized. Second, since A and B, or, events generally, so long as variably co-present and successive, are non-causal, causal events are not variably co-present and successive. In other words, causation provides a definitive version of past, present, and future, though its version is restricted, as I have already observed. All three points here, that co-present and successive events which are spatially separated are not cause and effect to each other, that succession is wider than causation, and that causation involves irreversible succession, are affirmed in our account of causality on general grounds, independent of whether they are really implied, as I think they are, in the above statements of Whitehead.

as measured by physics. In private time, lapse is relative to the experient. A lecture is reckoned long by one person, short by another. Such private calculations of time lapse, however, can be correlated, and their relativity removed by a standard clock. An exact quantitative value, the same for the various experients, can be fixed. In physical time, such quantitative non-relativity of time lapse holds for synchronous clocks located in the same reference body. Their recordings for two spatio-temporally separated events, such as the beginnings of two hour-apart lectures in different rooms, will be congruous. But synchronous clocks located in different reference frames, one in uniform rectilinear motion and one at rest, will give different metric recordings for the time-interval between the events. C. D. Broad says: "the time-lapse between two remote events has a different measure according to whether it is determined by clocks which are at rest relatively to the events, or by clocks which are in uniform rectilinear motion relatively to them. The discrepancy between the two measures depends on the spatial separation between the two events, in the direction of the relative motion of the two platforms." [41]

In its special form, the Theory of Relativity is an attempt to set up formulae, such that the metric value

[41] *Scientific Thought*, p. 147.

of the space-time interval found from a given reference body can be transformed into the metric values that will be found from any other reference body in uniform rectilinear motion relative to the first. That is, it is an attempt to correlate up to a certain point, the quantitative relativity intrinsic to spatial and temporal order, as now measured by physical methods.

Besides bringing before us such quantitative relativities, recent physical theory has rendered questionable certain mathematical characteristics traditionally applied to physical time, *e.g.*, compactness, infinite divisibility. But the situation here is exactly the same in principle as that in regard to physical space, and requires no comment beyond that already made.

As to mathematical time, after our discussion of mathematical space, this needs only the shortest description. Mathematical time is as sequentless as mathematical space is extensionless. Mathematical space is a relational system of entities without extension or spatial spread; mathematical time is a relational system of moments, which are entities without temporal spread. Like the mathematical point, the moment is definable by the Method of Extensive Abstraction so that it is at once logically pure and moored to the physical flux. The definition is in terms of sets of over-lapping events infinite at their small ends. "Each moment," as A. N. Whitehead writes, "is a group of

abstractive sets."[42] Mathematical time, so defined, affords the type of ideal entity wanted for formulation in simple terms of the laws of mathematical physics. At the same time, it puts these laws under an inevitable limitation when they are applied to the events of physical nature, which illustrate ideal entities only approximately. As usually conceived, mathematical time is uni-dimensional, unlike mathematical space which is ordinarily conceived as *n*-dimensional. To assign interval in mathematical time, ideally only one number, the mathematical distance from a chosen moment, is required. In other fundamental respects, however, mathematical time is indistinguishable from mathematical space. Both are continua of the mathematical type. Bergson has said that the time of mathematics and of mathematical physics, is not real time, but space. This is substantially correct, if by space is meant, not physical or psychological space, as Bergson seems to suggest, but uni-dimensional mathematical space.

4. *Space-time.*

In our discussions of physical space and time, I mentioned that the metric value of spatial interval or distance is affected by one's time-system with its peculiar determination of simultaneity, and that the metric

[42] *Concept of Nature*, p. 85.

value of time-lapse is affected, among other things, by the spatial separation, or distance, between events. "Inextricably our measurement of distance and of time-lapse," as Broad writes, "are bound up with each other."[43] The measurement of spatial interval requires temporal considerations, the measurement of temporal interval requires spatial considerations. Space and time are necessarily inter-involved in the measurement of physical fact.

Hermann Minkowski first announced the necessity of abandoning space and time as independent things. "Henceforth," he wrote, "space and time as independent things must sink to mere shadows, and the only thing which can preserve some sort of subsistence is a kind of union of the two."[44] There arose from this the idea of space and time as a single space-time structure. Mathematically, this structure was conceived as a relational system of point-instants. Physically, the structure was conceived as a relational system exhibiting matters of fact as four-dimensional relational facts, whose location required four numbers, the values of the three space and one time variable, relative to a body of reference.

In science, the conception of space and time as united, originated, as I have said, in the measurement

[43] *Scientific Thought,* p. 147.
[44] *Principle of Relativity,* p. 73.

of the two. It is commonly remarked that the aim of science is to measure, not to elucidate the real nature of things beyond their measure. In any case, because space and time required each other in proper scientific measurement of either, the space-time interpretation of world-structure was initially adopted.

This interpretation of space and time as united, however, has more significance than a merely temporary necessity of physical procedure. It has also a philosophical foundation and importance. Indeed, it is a consequence of our own basic position, that the continuant and event are inter-ingredient. Space, as I have said, is the extensional structure of continuants, time the sequential structure of events. Hence, the view that events and continuants go together and involve each other, which is our theory of inter-ingredience, implies that space and time are not two independent things, but go together and exist united. It implies a space-time union there for detailed metric description by physical theory. It must be confessed that this implication of a general space-time union is not the outcome of our own philosophical analysis only. It is involved in other positions, such as S. Alexander's Space-Time world-view, and A. N. Whitehead's philosophy of events.[45] In section one of this chapter

[45] *Concept of Nature*, p. 132: "The whole object of these lectures has been to enforce the doctrine . . . that the ultimate fact of experience is a space-time fact."

and in section two of our second chapter, discussing the relativity of events to continuants, I have stated grounds against accepting as adequate a philosophy of mere space-time, and a philosophy of mere events. The spread of fact appears to demand the larger triadic scheme of the event-continuant philosophy. Still, so far as a general space-time union goes, the three philosophies are on a par. All three imply the space-time union.

Incidentally, the definitions of space as the extensional structure of continuants, and of time as the sequential order in events, true so far as they go, are over-simple. Events are in space, continuants in time, so space is not merely a structure of continuants, nor time merely an order in events. The more adequate definitions are that space is the extensional structure, time the sequential order, in concrete fact, the unity of event and continuant. Since events and continuants involve each other in this fact, the recognition that events are in space, continuants in time, on which these new definitions are based, equally implies that space and time are not two independent things, but united in concrete fact.

Besides its significance in philosophy, the union of space and time requires mention of two minor points.

First, the union of space and time does not mean

that all distinction between physical space and time has vanished. Some have tried to picture physical space-time as a four-dimensional space. This is misleading, except possibly in mathematics, where the distinction between a four-dimensional space continuum and a four-dimensional space-time continuum is necessarily tenuous, as previous discussions imply. The situation here is analogous to the event and the continuant. In concrete fact, the two are united, each requires the other in its determinate being. Yet the two are quite distinct, as we have seen. C. D. Broad writes: "The Special Theory (of Relativity) breaks down, not the *distinction,* but the isolation of space and time."[46] Space and time are as distinct as event and continuant, and as united.

Second, common thought has long ago inter-locked space and time, so that their union in recent physics is more a variation than a contravention of common usage. For example, in ordinary discourse, one says: "New York is two train hours from Philadelphia," and when asked how long one must wait, the reply may be: "Oh, as long as it would take you to walk around the block!" In ordinary experience, spatial interval is often expressed in terms of time, temporal interval in terms of space. To be sure, this is a long way from the mutual inter-relevance of space and time conceived

[46] *Scientific Thought,* p. 486; italics in text; parenthesis mine.

in relativity physics. But it does indicate that, even in uncritical thought, space and time long ago have been tacitly considered, not as separate things, but as connected aspects of the same whole.

CHAPTER V

Causality

1. *Hume.*

In the previous chapter, space and time were interpreted as primarily relations of matters of fact, or, ontological relations. A basic theme of the present chapter is that causality is also an ontological relation. I will approach this theme by a discussion of Hume's theory of causality, which is probably the most famous of all past theories.[1] Like an economical Scot, Hume pruned from the causal principle almost all of its ordinary content. Since recent theory has been an attempt to re-introduce many of the elements which Hume cut out, it is especially fitting to begin a discussion of causality with Hume's views.

In simplest terms, Hume's theory is that causality is constant conjunction accompanied by a disposition of the mind to believe it to be more. This disposition

[1] Aristotle's theory of causality, of course, is also famous. Aristotle distinguished four causes: material, formal, efficient, final. The material and formal causes are the matter and form discussed in Chapter I. The final cause is purpose discussed in Chapter VI. Causality means to-day primarily efficient causation, which Aristotle understood in the commonsense way challenged by Hume.

is to believe in necessary connexion. If X is the cause of Y, we are disposed to believe not merely that Y is conjoined with X, but that Y is necessitated by X. The belief that necessity is an element of the objective situation, according to Hume, is founded on subjective inclination, on the force of habit and imagination in the mind of the observer. It is not warranted logically, or, empirically, by the objective facts. Examine X or Y perceptually, or, conceptually, you will find nothing of 'power' or necessitation in them, but merely constant conjunction between them.[2]

To illustrate: let X be a draught, Y a cold-in-head, conjoined as cause-effect. People commonly believe here that the draught itself is necessarily connected with the cold in the head. According to Hume, this supposed objective necessity is not to be found in the objective situation. It is not evident there, either to the senses, or to abstract reason. Consider the situation abstractly. Draughts do not necessarily imply colds in heads. Many other alternatives are equally implied, such as moving away from the draught, shutting off the draught, *etc.* No demonstrative logical[3]

[2] John Laird, *Hume's Philosophy of Human Nature,* p. 133, states the matter in the following way: "Hume's critical analysis was restricted to showing (a) that the nature of X, considered in itself, does not logically imply the nature of Y, and (b) that the perceptible qualities of X, taken alone, do not include a 'power' of producing Y."

[3] The so-called logical necessity between causal terms mentioned here is, in our sense, epistemological, rather than logical, *i.e.* a restricted logical necessity. Out of deference to the usage prevailing overwhelmingly in

necessity ties X just to colds in the head. Nor does direct experience testify to any inexorable necessity between X and Y. Examine a draught as much as you please, turn it on every side, you will find nothing in it, no power, no force, which makes a cold in the head an inescapable consequence of the draught. The most you will find is that given X and a human being suitably exposed to X, a cold in his head as a matter of fact arises; and unless X-Y is strongly analogous to a conjunction which has been observed frequently to occur, the notion of necessity does not appear in the experience. It appears only after the conjunction X-Y has been observed at least several times.

Since necessity is not to be found in single causal transactions themselves, Hume concludes that it is not an original element of a causal transaction. It is an importation. It is derived from the observer's mind. Due to frequent observation in his experience of resembling X-Ys, a new impression forms in the observer's mind. An association, or habit, is built up, which propels his imagination, when X occurs, to expect Y. This mental force or propulsion, based on association by resemblance, is projected instinctively into the objective situation. And from this arises the fiction that the events in the situation are themselves

the literature on causality, I use the term logical here, in the discussion of recent writers below, and throughout this chapter.

connected by force, or necessity. So far as reason and observation go, however, events themselves are not so connected, or connected at all. "All events", Hume writes, "seem entirely loose and separate. One event follows another; but we never observe any tie between them. They seem *conjoined,* but never connected."[4]

Hume's analysis of causality has important merits, as we shall grant. But Hume's theory that causation is mere constant conjunction plus a fiction of the imagination, is open to serious criticisms. I will mention two criticisms, one dialectical, one empirical.

First, Hume's doctrine of causality appears incompatible with his general philosophical position. For example, in explanation of the source of the impression of necessity, Hume writes: "the *observation* of this resemblance (between several instances of X-Y) produces a new impression *in the mind,*"[5] namely, the impression of necessity. Now, what does the word 'produces' here mean? Constant conjunction? If so, the observation of the resemblance is no explanation of the *source* of the new impression, as Hume seems to believe. Merely, you have the observation, then, inexplicably you customarily have the new impression.

[4] *Enquiry Concerning Human Understanding,* Sect. V, Part II; italics in text.

[5] *Treatise on Human Nature,* Bk. I, Part III, Sect. XIV; italics in text.

And the two have no real connexion. That is all the doctrine of constant conjunction permits. Only if Hume is allowed to give 'produces' another meaning, which he tacitly does, namely, 'originates' or 'determines to exist,' may Hume be said at all to have explained here, as he believes, the source of the impression of necessity.[6] This point may be stated more broadly. The cornerstone of Hume's philosophy is that *"our simple ideas in their first appearance are deriv'd from simple impressions."*[7]. On this principle, Hume analyzes complex ideas, such as the idea of causality, and claims to test the simple elements of these ideas by the original impressions from which they sprang. But what does the phrase 'deriv'd from' mean in this passage? Constant conjunction? If so, our simple ideas cannot be traced back to and connected with simple impressions as their original, as Hume ostensibly maintains. You have a simple idea which inexplicably, yet customarily, is preceded by a simple impression. And the two have no real connection. That is all the doctrine of constant conjunction permits. 'Deriv'd from'

[6] Jacob Loewenberg, *The Elasticity of the Idea of Causality, Univ. Calif. Pub.*, May 1932, p. 19: "If custom can 'produce' a propensity, as Hume alleges, why could not one event be described as 'producing' another? Between the propensity and the custom generating it, there, at any rate, we seem to have necessary connection." "To assert that the propensity is so induced, . . . is . . . affirming the validity of causality in the very attempt to deny it." J. Laird, *Hume's Philosophy of Human Nature*, p. 130: "palpable contradiction."

[7] *Treatise on Human Nature*, Bk. I, Part I, Sect. I.; italics in text.

must have here its ordinary meaning, 'produced from' or 'determined to exist by', if Hume may go back, as he does, from idea to impression, and connect the idea with the impression as the original and source on which it is based. Thus, Hume's whole empiricism rests on real connection and causal determinism, and, if real connection and causal determinism are fictions of the imagination, as Hume's causal doctrine claims, Hume's empiricism is a fiction of the imagination. And so are the doctrines which Hume bases on his empiricism, including his causal theory.

Besides dialectical difficulties, Hume's theory of causality has to face empirical difficulties. For example, many instances of constant conjunction are not causal sequences.[8] Day is constantly conjoined with night, but day is not the cause, nor the effect, of night. The cause of day, and of night, is the rotation of the earth relative to the sun. Some may object that in such cases as day-night the subjective feeling of necessity is absent, a feeling which is, according to Hume, an integral part of the causal picture. In reply, one is tempted to ask why this feeling is absent when at least all the objective conditions which Hume holds give rise to it, are present. But it is sufficient to add two remarks. First, this subjective feeling is not, in Hume's

[8] C. J. Ducasse, *Causation and The Types of Necessity*, pp. 16-17, 21, 29, 93.

view, a really objective element in the cause-effect situation. Constant conjunction is the great objective mark. As a sequence, therefore, day-night is objectively all that Hume says cause-effect is. Still day-night is not objectively cause-effect, as I have just observed. Second, many constant conjunctions even vividly accompanied by the subjective feeling of necessity, are also not cause-effect. Chantecler, the cock who crowed and felt his crowing necessitated the rising of the sun which customarily followed, is a symbol of myriad instances, particularly among children, gamblers and astrologers, where a certain event repeatedly precedes a certain result, and is felt by the person to necessitate the result. But the result is really established by other events, as wiser experience shows. Such sequences completely fulfil Hume's specifications regarding causal sequences, constant conjunction plus subjective feeling of necessity, yet they are not causal at all. Causality holds between a member of the sequence and something outside the sequence, but not between the members of the sequence themselves.

Hume's formula for causality, then, does not fit experience, nor Hume's own philosophy of experience. Yet Hume's analysis of causation is far from vain. Hume's analysis insists on at least two points of great importance. First, Hume interpreted causality as an

ontological relation, as a relation of matters of fact, placing it in a spatio-temporal context. This point is maintained throughout our entire account. Second, Hume showed that absolute demonstrative necessity, such as rationalists dreamed to hold between concepts, does not hold between causal terms. That is, Hume showed that there can be no absolute demonstrative certainty about "*what particular* Y must necessarily follow it (X)," [9] *e.g.*, about what particular effect must follow a given draught. Hume's argument for this position, based on reason and direct experience, is sketched above, and seems acceptable, and I shall accept it. Unfortunately, Hume's result here leaves much to be said, both about causal necessity, and about other problems of causation.

In this historical reference, brief mention of Kant's views might be advantageous. As usual, Kant's views are difficult to state, but, as widely understood, are as follows. Causality is an *a priori* categorical form or relation, injected by mind into nature to make natural processes orderly and intelligible. This relation imparts a rule of succession to the manifold of sense-events under the form of time. In consequence, this manifold exhibits an irreversibility of succession in the order of perception. This irreversibility of succession

[9] J. Laird, *op. cit.*, p. 101; italics in text.

is the objective empirical mark of the causal order as it appears before the conscious mind.[10]

There is, of course, one feature of this position which is obviously unacceptable from our standpoint, namely, its subjectivism, that causality is a mental injection. Kant's general arguments here are practically the same as the arguments for the subjectivity of space and time already examined, and need not be re-examined. But I will add one remark. Causality, as Kant claims, may be a universal and necessary condition for human knowledge of objects. But conditions which the mind must always allow to attain the ends it attains, such as knowledge, may be just as much conditions which are universally laid down to mind, as conditions legislated by mind. World-fact may be such that mind to know must always allow so-and-so to hold. And in the present case in particular, the truth seems to be that causality is involved, not in the universal nature of mind, but in the universal nature of events. Like time, causality is a form in which events stand, not because they are minded, nor because thereby they become objects of mind, but because they are events. This point is argued in section three below.

Kant's subjectivism, of course, re-echoes Hume's. In Hume's view, connection in a causal situation, as dis-

[10] *Critique of Pure Reason,* Müller Trans., 2nd ed., p. 155 *ff*. *Cf*. C. J. Ducasse, *Causation,* Chap. 3. J. Loewenberg, *op. cit.* N. K. Smith, *Commentary.*

tinct from mere conjunction, is the work of mind. This is also Kant's view. There is this difference: the mental element for Kant is *a priori,* projected by the productive or creative imagination, and constitutive of objective phenomena, whereas for Hume the mental element is *a posteriori,* a fiction of the reproductive or associative imagination, and void of objectivity. This difference is concomitant with another most important difference. Kant's theory places irreversibility of succession instead of constant conjunction, in the center of the causal picture. This shift implies, among other things, a real objective necessity in causal sequences. Irreversibility of succession secures a real objective necessity. X-Y, as irreversible, are necessarily joined so-and-so, not otherwise. Hume recognized succession as a causal constituent. But Hume denied all objective necessity in the causal succession. He declared all events to be loose.

This making of irreversibility, instead of constant conjunction, central, is, I think, a considerable advance. And it is an advance not merely because it recognizes an objective necessity which is really present in causal sequences. It also turns up another authentic constituent of causation, namely, irreversibility itself, on which this necessity is founded. One may well doubt whether constant conjunction is at all an authentic element of causation. I have argued that many constant conjunc-

tions are not causal sequences. It might equally be argued that many causal sequences are not constant conjunctions. The sequence draught-cold is causal, but not constant. Often draughts are not followed by colds, nor colds preceded by draughts. One might go farther, as some do. They argue that no causal sequence at all is a constant conjunction. They hold that causation is a relation between individual events, that individual events happen only once, and therefore, can be conjoined only once, not again and again.[11] Hume, says Laird, "did not even contemplate the possibility of non-uniform causes."[12] The least that can be said about this is that this possibility is being very much contemplated by current quantum physics. Thus, an argument against constant conjunction as an authentic character of causal transactions would have its points. In contrast, irreversibility of succession interpreted in a certain way, namely, that the effect always follows its cause in existence, never *vice-versa*,[13] appears to be a reasonably well-grounded constituent of causal processes. An effect always follows its cause in this sense, never *vice-versa*, because an effect is not in existence and in a position to precede or follow any-

[11] C. J. Ducasse, *Causation, passim.*

[12] J. Laird, *op. cit.*, p. 103. *Cf.* G. F. Stout, *Manual of Psychology*, 3rd ed., pp. 444-446.

[13] Kant, *Critique of Pure Reason*, Müller Trans., 2nd ed. rev., pp. 165-6, interprets causal irreversibility in this way.

thing in the sequence of existence, until its cause has already caused it and therefore is antecedently in existence. I will recur to this important point in sections two and four below.

Even so, the question remains whether causality is merely irreversibility with the necessity which irreversibility provides. Is it not more? Recent theory claims it to be more.[14] Recent theory suggests that causality has two additional constituents, which I will call logical determinism, in our sense epistemological determinism, and existential determinism. There are two leading current doctrines. Writers, such as Bertrand Russell, James Ellis McTaggart, and C. D. Broad, observing the procedure in the theoretical sciences, chiefly physics, hold causality to be a rule of inference, or, as they sometimes say, a logical, in our sense epistemological, relation. Others, such as S. Alexander, going behind scientific theory to the existential facts which science presumably explores, hold causality to be a principle of existential determinism. Causality is a relation of matters of fact. I propose now to discuss these two doctrines, beginning with so-called logical determinism. My thesis will be that existential determinism is the fundamental truth about causation, that logical

[14] Kant, *Critique,* p. 166, appears to hold that causality is more, namely, dynamical connection, in our terms existential determinism. He describes irreversibility as merely an observational sign, or empirical criterion of causation.

determinism, so far as it goes, is true of causal situations, but seriously inadequate if taken in the way it is usually offered, namely, as the complete truth about causality.

2. *Logical Determinism.*

The logical determination theory of causality may be stated as follows: Causality is a type of determination, as J. E. McTaggart says: "a determination of Implication. The cause implies the effect. . . . Strictly speaking," he adds, "implication is a relation between propositions, or truths, and not between events. But it is convenient to extend our use of it, so as to say that, if one proposition implies another, then the event asserted in the first implies the event asserted in the second."[15] Strictly speaking, however, causality is propositional implication. C. D. Broad writes: "The law of causality is perhaps the assertion that to every true proposition that asserts the happening of an event at a time there is a set of relevant true propositions such that relative to the whole of them the probability of the event happening is 1." Again: "a cause in the most general sense is a set of successive sets of contemporary events from which other sets can be inferred."[16] That is, a cause is a logical entity which

[15] *Meaning of Causality, Mind,* 1915, p. 326, p. 327.
[16] *Perception, Physics, and Reality,* pp. 153-4, and p. 137.

allows propositional inference to other such entities. Bertrand Russell finds it difficult to state his views of causality in non-mathematical language, but proposes the following as nearest to a correct non-mathematical statement: "There is a constant relation between the state of the universe at any instant and the rate of change in the rate of change at which any part of the universe is changing at that instant, and this relation is many-one; *i.e.,* such that the rate of change in the rate of change is determinate when the state of the universe is given." The determinateness mentioned here, Russell explains, is so-called logical determinism, namely, determination of some variables by others through the agency of a law, or, general rule of inference. "The law," Russell says, "makes no difference between past and future: the future 'determines' the past in exactly the same sense in which the past 'determines' the future. The word 'determine', here, has a purely logical significance: a certain number of variables 'determine' another variable if that other variable is a function of them." [17]

The logical determination theory is often described as the theory of causality accepted by physical science. This is partly true. As understood by physical science, a causal law is a differential equation by which "from

[17] *On the Notion of Cause, Aris. Soc. Proc.,* 1912-13, p. 14, and p. 15; reprinted in *Mysticism and Logic.*

the position and state of motion (of a system) at a given instant one can calculate the position and state of motion at an infinitely near earlier or later time."[18] That is, causality in physics is logical determinism of a special type. In this form, the logical determination theory has lately undergone trials in physical science itself, which will be discussed in the concluding section of this chapter. The point here is that the logical determination theory is broader than its special scientific form, not being limited to differential equations dealing with position and states of motion. A causal law is "any general proposition in virtue of which it is possible to infer the existence of one thing or event from the existence of another or a number of others."[19]

It can hardly be denied that the logical determination theory enshrines an important truth about causal situations. I would state this truth as follows: given a certain amount of data (valid information, propositions) about a cause or effect, and the general law (epistemological structure) of the situation, one can infer, or determine logically (epistemologically) a certain amount of valid information (propositions) about the effect or cause. Or, stated technically, hypothetical ground-consequent holds reciprocally between causal

[18] Victor F. Lenzen, *Physical Theory*, p. 290; parenthesis mine.
[19] B. Russell, *Our Knowledge of the External World*, Amer. Ed., p. 213.

terms. Within the restrictions stated in the concluding section of this chapter, this claim seems to me entirely correct, so far as it goes. There is, however, this flaw. Hypothetical ground-consequent also holds reciprocally between the terms of situations which are not causal. Hence, if causality is reduced completely to hypothetical ground-consequent, and this is what the logical determination theory attempts to do, all that is distinctive of causality vanishes. More precisely, cause and effect lose their distinctive meaning, and causality itself becomes indistinguishable from many other types of relations.

The first point is generally admitted. "Our definition of causality" McTaggart writes, "gives us no criterion for distinguishing one term as cause and the other as effect. . . . The course that I think most convenient therefore is to speak of causal relations as existing between two terms, but not to speak of one of those terms as cause, and of the other as effect." [20] In a quotation already given, Russell states that future (effect) determines past (cause) in exactly the same sense as past determines future. That is, neither causal term is distinguishable from the other, so far as so-called logical determination or 'causing' goes. Broad believes a difference remains as long as a causal law is logically non-reciprocal. "On the other hand when

[20] *Meaning of Causality*, p. 338.

the causal law becomes strictly reciprocal I doubt if it be possible any longer to give a reasonable meaning to the distinction between cause and effect." [21] But if effect is taken in a law with exactly equal generality as cause, which is always theoretically possible, *e.g.* in the connection friction-heat, the heat is taken as the heat-produced-by-friction, a causal law becomes logically reciprocal.[22] Cause and effect then become logically inter-determinate. In view of this possibility, Broad also may be taken as admitting that, on the theory of causality he supports, no reasonable meaning to the distinction between cause and effect exists.

This first result may seem to some quite unimportant, but I think it is unfortunate, for the following reasons. In the first place, common thought does recognize a real difference between cause and effect. For example, common thought would hold that the fall of rain to earth caused the subsequent wetness of the earth, but not that the subsequent wetness of the earth was the efficient cause of the preceding fall of rain. In general, common thought holds that a cause causes its effect, but not that the effect is the efficient cause of its cause. In its view, causal determinism is one-way event determinism. In the second place, this commonly recognized distinction between cause and

[21] C. D. Broad, *Perception, Physics, and Reality,* p. 127.
[22] H. W. B. Joseph, *Introduction to Logic,* Chap. XXII.

effect, is really neither contradictory to, nor taken up in, logical determination. Strictly speaking, so-called logical determination is propositional implication. It means merely that propositions about the cause (*e.g.* there exists at t falling of rain) imply and are implied by propositions about the effect (*e.g.*, there exists at t_1 wetness of earth from rain). But even if propositions (truths) about rain and the occurrence of wetness stand to each other in this way, the rain and the occurrence of wetness which are events not propositions, may still stand to each other in the commonly conceived way. Two-way propositional implication is not incompatible with one-way event determination. Granted the second, the first would still hold as completely as it ever has. Nor does two-way propositional implication take up and include under it one-way event determination. That is, this latter determination is not a sub-type of propositional implication, nor a type of propositional implication at all. It is a determination, not between truths, but between existents, namely events. Thus, common thought has hold of a distinction which is not contradictory to logical determination, nor taken up and contained in it. Yet, if logical determination were considered the whole of causation, as the logical determination theorists desire us to consider it, we would be forced to give up this distinction, since logical determination itself does not make it, and

the logical determination theory officially denies all distinction between cause and effect. I submit that one ought not to give up widely recognized distinctions unless in reason one must. Since the logical determination theory, taken as a complete account of causality, would force us without reason to give up such a distinction in regard to cause and effect, I think we should conclude that this theory simply has missed something distinctive in causal situations, and therefore is not a complete account of causality, or, of cause and effect.

The second consequence of taking logical determination as the entire story, is that it robs causality itself of distinctiveness, making it one with other types of relations. Bertrand Russell writes: "*any* case of sufficiently frequent sequence will be causal in our present sense; for example, we shall not refuse to say that night is the cause of day."[23] Thus, causality and constant succession become indistinguishable. And C. D. Broad writes: "there is no difference in principle between the connexion of cloven-footedness with chewing the cud and that between the momentary states of the fire and the water." That is, there is no difference in principle between a co-existence and a causal connexion. "In the example of cloven-footedness and ruminance," Broad writes, "I think that we must admit that we

[23] *Mysticism and Logic,* p. 193; italics in text.

have a very specialized case of a causal law."[24] On the logical determination theory, then, constant co-existence as well as constant succession is indistinguishable from causation. And it is obvious that on this theory other relations would be indistinguishable from the causal relation, *e.g.*, constant uniformity.

In principle, the difficulty with this second consequence is the same as that with the first. Just as common thought recognizes a real difference between cause and effect, so it also recognizes a real difference between a mere co-existence, mere succession, *etc.*, and a causal relation. For instance, it would hold that the prickliness and the greenness of a live pine-cone merely co-exist, but not that the prickliness causes the greenness, nor the greenness the prickliness. Furthermore, common thought can grant that causal situations exhibit logical inter-determination and that constant coexistences, and so on, also exhibit logical inter-determination, yet hold that this does not really cancel or absorb its distinction between causality and constant co-existence, *etc.* A proposition about one constant co-existent (*e.g.* there exists prickliness in this live pine-cone) may imply and be implied by a proposition about another co-existent (*e.g.* there is greenness in this cone, perceptible under certain conditions), just

[24] *Perception, Physics, and Reality,* p. 128, and p. 130. The causal relation referred to in the first of these two quotations is that between a fire and water boiling in a kettle over the fire.

as propositions about causal terms do. Still, this concerns the relations between propositions (truths), whilst what common thought is concerned with is the prickliness and the greenness, which are existents not propositions. These, it says, merely co-exist, they do not cause each other; and the relations between propositions may be just as they are without changing this matter. That is, propositions about constant co-existents may be as logically inter-determinate as it is said they are, yet co-existents may still be considerably different existentially from causes. Suppose co-existents to be constant co-existents but not causes, as common thought holds, you would still have logical inter-determination between propositions about co-existents, as you still would between propositions about causal terms. Logical determination is completely compatible with the difference envisaged by common thought. Nor does logical determination take up and contain this difference between co-existent and cause. This difference is a difference between existents, not between truths. It cannot be classified as a propositional relation, nor as a difference between propositional relations, the one type of difference logical determination might take up. It is not concerned with propositions at all, but with something else.

Thus, once again, common thought has hold of a distinction which is not really contradictory to mere

logical determination, nor taken up and contained in logical determination. Yet, if logical determination is taken to be the whole of causality, as the logical determination theorists desire us to take it, we would be forced to give up this widely recognized distinction, since logical determination itself does not make it, and the logical determination theory officially denies all distinction between causality and such relations as constant co-existence. Again, I submit that one ought not to give up widely recognized distinctions unless in reason one must. Since the logical determination theory, taken as a complete account of causality, would force us without reason to give up such a distinction between causality and such relations as constant succession, constant co-existence, and so on, I think we should conclude that this theory simply has overlooked something distinctive and differential about causality, and therefore should not be taken to be a complete account of the causal principle.

What the logical determination theory has overlooked, and common thought kept in view, is, as I have suggested, existential determination. One item of a causal situation is not only inferable under certain conditions from another (logical determinism), but it is also brought into temporal existence by the other. And as common thought holds, and as Kant held, this existential determination is from cause to effect. It is

not reversible, as is logical determination. A cause brings its effect into existence, but an effect does not bring its cause into existence, for the simple reason that an effect is not in existence and therefore in a position to bring anything else into existence, until its cause already has existed and brought the effect about. Existential determination distinguishes a cause from its effect. A cause determines its effect in this way, but its effect does not so determine its cause. Existential determination also distinguishes causality from other relations. Existential determination is not shared by such relations as constant co-existence and constant succession. In constant co-existence, you have two items already existing together, such as greenness and prickliness, not one being brought into temporal existence by the other. Similarly, constant succession, such as night-day: night does not bring day into existence, nor day night. Each is brought into existence, as I have said, by the rotation of the earth in relation to the sun.

In reducing causality to inferability, then, the logical determination theory simplifies causality too much. Nevertheless, this theory has made a contribution to our understanding of causal situations. Hume appears to have believed that his demonstration of the absence of absolute rational necessity as to what particular Y will follow X, disproved all rational determination in causal situations. All so-called rational determination

is mere irrational or animal habit. The logical determination theory corrects Humism on this point, showing that at least one type of rational determination, the conditional, is possible in causal situations: namely, data (reports) about causal elements allow rational inference to others, wherever sufficient data (reports) and the law of the causal situation are known. Kant added irreversibility to Hume's spatio-temporality. The logical determinists add conditional rational interconnexion to Hume's attenuated account.[25] In adding existential determination, I believe we add the root and defining property of causation, the heart of causation, and the last of the essentials of causal situations which Hume cut out. In denying all connexion between cause and effect, Hume officially dropped existential determinism. Yet Hume's general empiricism, as well as his doctrine of the origin of necessity, as I have already indicated, are tacitly grounded on existential determinism, on something deriving its existence from something else, and are worthless as explanations of the source of knowledge and of necessity without it.

3. *Existential Determinism.*

By existential determinism is understood here the determination of something to exist (effect) by some-

[25] Kant, *Critique of Pure Reason,* N. K. Smith Trans., p. 248: "No necessity in nature is blind, but always a conditional and therefore intelligible necessity."

thing else (cause). This determination, I think, is a common fact. For instance, a man spreads red paint by brush over the surface of a table previously white. As his brush spreads, the surface changes from white to red. I submit that in this situation and under these circumstances, the spreading of the red paint by this man's brush, brought into existence the change of the color of the table's surface from white to red. Again, a billiard ball rolls across an undisturbed table, striking a stationary second billiard ball, which thereupon moves. I submit that in this situation and under these particular conditions and circumstances, the impact of the first ball on the second brought on the existence of the rolling of the second billiard ball. Such, as I think, is the crude, given causal fact which experience shows. I wish first to explore this fact somewhat.

A cause is something which existentially determines something else. But what sort of something? Uncritical thought appears to hold that a cause is a thing, or a person. When the window is broken, it says that the ball broke the window. When a door is forced, its reply is that the policeman forced the door. Now, if this means that causes are continuants, not events,[26] this

[26] Probably this is not really meant. Common discourse speaks as if it were. But this may be due merely to the fact that in everyday affairs one is primarily interested in dealing out responsibility, even rewards and punishments, and for this one naturally seeks those entities which are as permanent as possible. Since continuants are always in-

mode of speaking is erroneous. In the case of the door, for example, the cause, I think, is the lunging performed by the policeman against the door. It was this lunging of the policeman against the door, the event, which actually gave rise to the sequent, the opening of the door. A. N. Whitehead writes: "It is an error to conceive of objects as causing an event." "Primarily a cause is always an event, namely, an active condition." [27] The reader will find this dynamic view of cause borne out by an entire account.

This position, that causes are events, does not mean that continuants are either absent from, or negligible in, causal transactions. Continuants are present, since events always involve continuants. Moreover, continuants are far from negligible. In the first place, continuants constitute circumstances involved throughout the play of causal events. The continuants, policeman and door, were obviously involved throughout the transaction, the lunging of the policeman—the opening of the door. In the second place, in causal transactions continuants are determinants of character in cause and effect. The lunging of the policeman and the opening of the door, cause and effect, not only involve the policeman and the door, but are indetermi-

volved with events, and are more permanent, the shift from events to continuants occurs.

[27] *Principles of Natural Knowledge*, p. 73, p. 90.

nate in character as these particular events without the policeman and the door. Their natures require these continuants.[28] Incidentally, these two roles of continuants in causal situations, as circumstances concomitantly involved in the play of the causal events, and as determinants of character in the causal events, follow from two principles described in our second chapter, the principle of the relativity of events to continuants, and the principle of the ingredience of continuants in events.

As to effects, I think that they are not limited to events, as are causes. There are two types. Effects are events, and states of continuants. Thus, in the situation above described, an effect is the event, the opening of the door. But an effect also there is the continuant state, the opened-up condition of the door. Both may be called effects, because both are consequents of causal events there. The opening is a consequent of the pounding and lunging of the policeman against the door. The opened-up condition is a consequent of the swinging open of the door. This state was brought into existence by the swinging open of the door, just as the swinging open itself was brought into existence by the pounding of the policeman

[28] A. N. Whitehead, *Principles of Natural Knowledge,* p. 90. W. E. Johnson, *Logic,* Part III, p. 86. Chapter II above.

against the door. Like the event, the continuant state was effected by an event as cause.

I have said that existential determination is a fact. But is it a brute fact, a fact which defies analysis? Or, can it be analyzed? Can it be rendered intelligible? I think it can be rendered intelligible. There are two types of existential determination to consider, first, where effects are novel states of continuants, and second, where effects are events.

The first case, effects as novel states of continuants, presents little difficulty. I have said that causes are events. But by their nature events are transitions beyond what is. If no new states of affairs, no on-goings; if no on-goings, no events. Events carry forward the material of continuants. Hence, an event simply has not been, nor continuants figured in it, if there is no occurrence of a state of affairs somehow beyond the state at the start in the continuants. The particular nature of the novelty will depend on the particular continuants involved. This point is irrelevant here. The problem is to show why, given a cause, there should be any novelty at all in continuants. This is so, I say, because a cause is an event, and an event carries forward to a new stage the material of continuants, and, therefore, involves by nature sequent novel states of continuants.

The second case, effects as events not states, requires a different explanation. A current theory, properly interpreted, seems to me acceptable here. Bernard Bosanquet writes: "An effect is a continuation of a process into a further stage."[29] S. Alexander writes: "(the) notion of causality as a connection of events is inadequate so long as an event is regarded as an isolated occurrence and not as a process which if the event is a cause is continued into the event which is the effect."[30] As Loewenberg observes, causal transactions exhibit a consummatory character, "the tendency of one event to complete itself into another."[31]

An effect as event, then, is simply a prolongation into a new stage of the cause as event, *e.g.*, the opening of the door is simply a prolongation into a new stage of the lunge against the door which caused the door to open. The policeman lunged against the door, and the door lunged open. Cause and effect are not mere identities.[32] Such a view would make nonsense of cause and effect as here conceived. For instance, it

[29] *Principle of Individuality and Value*, p. 197.

[30] *Space, Time, Deity*, I, p. 280. And p. 298: "(the) real activity (of a cause) consists in passing over into the effect." Parentheses mine.

[31] J. Loewenberg, *Elasticity of the Idea of Causality*, p. 23.

[32] E. Meyerson, *Identity and Reality*, tends toward this view, probably because Meyerson is here pre-occupied with the quantitative equivalence of so-called cause and effect, really of continuant energies involved in cause and effect, which used to be stressed in the natural sciences. S. Alexander, *Space, Time, Deity*, I, p. 286, writes: "(the effect) never is identical with the cause. That would be uniform motion and the universe would be a blank." Parenthesis mine.

would eliminate time,[33] and, therefore, events, since events require time. And much more would go, *e.g.*, irreversible succession, and, in general, existential determinism as we understand it. Prolongation, not identity, is the principle to be stressed in regard to cause and effect as events.[34] And given prolongation, the existence of an effect as event is seen not only to follow, but to follow from the existence of an event as cause: *e.g.*, the taking in of red paint by the table's surface, its changing to red color, is seen not only to follow, but to following from the putting on of the red paint, if the taking in is viewed as a prolongation into a new stage of the putting on. Moreover, prolongation is natural in events, since events, as Santayana has said, embody a forward tension, a propulsive on-go, going forward with the qualitative energies of world-fact to new existence.[35]

[33] J. Loewenberg, *Elasticity*, p. 23.

[34] W. E. Johnson, *Logic*, III, pp. 78-9: "it may be laid down as the first and most indubitable principle of causality that, whatever subtle relations there may be between cause and effect, the relation of non-identity is to be unequivocally asserted." Of course one can go too far in this direction, as did Hume. Presumably, prolongation involves some identity. M. R. Cohen, *Reason and Nature*, pp. 102-4.

[35] A. N. Whitehead, *Adventures of Ideas*, p. 251, recognizes prolongation, although he appears to lean a bit too much in the direction of Organicism, here and elsewhere, to be followed completely: "This individual objective existence of the actual occasions of the past, each functioning in each present occasion, constitutes the causal relationship which is efficient causation." And page 305: "Perishing is the initiation of becoming. How the past perishes is how the future becomes." "A pure physical prehension is how an occasion in its immediacy of being absorbs another occasion which has passed into the objective immortality of its

Existential determination, then, is not only a fact, but also an intelligible fact. It is rooted in events, and intelligible through events. Given events, you have existential determination of sequent events and continuant states, such as I have described. This general analysis of what is here regarded as the central and basic constituent of causation, puts us in a position to consider various detailed causal problems traditionally discussed. This discussion will clarify our general views, and bring out important detailed characteristics of existential determination which remain to be noticed. The causal problems I wish to consider are four, and concern spatio-temporal continuity, one-way determinism, infinite causal regress, and selection of causes.[36] I will devote a separate section to a discussion of these four causal problems.

4. *Causal Problems.*

The first problem has to do with spatio-temporal continuity. Are cause and effect spatio-temporally continuous, or not? The general answer I propose to

non-being. It is how the past lives in the present. It is causation." *Nature and Life*, p. 42, contains this most significant passage: "The only intelligible doctrine of causation is founded on the doctrine of immanence. Each occasion presupposes the antecedent world as active in its own nature. This is the reason why events have a determinate status relatively to each other. Also, it is the reason why the qualitative energies of the past are combined into a pattern of qualitative energies in each present occasion. This is the doctrine of causation."

[36] S. Alexander, *Space, Time, Deity*, I, p. 292 *ff*.

this question is as follows. Cause and effect, as matters of fact, are spatio-temporally continuous. One passes into the other without a spatio-temporal gap between them. There is no valid dialectical difficulty in affirming this particular matter of fact continuity. Supposed difficulties apply, if at all, to a logico-mathematical, not to an ontological interpretation.

The supposed dialectical difficulties found with continuity are two. First, continuity makes hopeless the discovery of real causes. Second, continuity makes impossible any real distinction between cause and effect.

In regard to the first difficulty, Bradley writes that, if cause and effect are continuous, one may take an infinitely thin slice of a causal sequence, and have the cause of all that follows. Yet, since an infinitely thin slice would occupy no real time, the cause of all that follows could not be said to be a real item.[37] Moreover, as Russell points out, an infinitely thin slice can itself be divided into earlier and later sections *ad infinitum*,[38] so, causes under continuity would not only not be real, but they would not be determinable, since no one can complete an infinite series.

It is easy to show that this first difficulty with continuity has no real dialectical force against our own ontological conception of cause and effect. The dif-

[37] *Appearance and Reality*, p. 61.

[38] *On the Notion of Cause, Aris. Soc. Proc.*, 1912-13, p. 5.

ficulty rests plainly on the assumption that cause and effect are mathematically continuous, or, at least, mathematically compact. Only in virtue of this property could a sequence be said to be really divisible into infinitely thin slices, or, *ad infinitum,* as is affirmed here. Now, this assumption is highly doubtful in regard to cause and effect as here conceived, namely, as concrete matters of fact. It cannot be proven scientifically. For example, Russell himself has written: "The theory of 'quanta' in physics, whether true or false, illustrates the fact that physics can never afford proof of (mathematical) continuity, though it might quite possibly afford disproof." And some hold that it does afford disproof.[39] In other words, the difficulty here, so far as our view of cause and effect goes, rests on an assumption, that concrete events are mathematically continuous, which is unproved scientifically, and perhaps disproved. Hence, the difficulty is not dialectically established.

I can state this point another way. Cause and effect, I say, are matters of fact, concrete events not extensive abstractions. And they are continuous in a matter of fact sense, namely, one passes into the other without a gap of empty space-time between them. Whether causal sequences are also mathematically continuous,

[39] *Introduction to Mathematical Philosophy,* p. 140; parenthesis mine. I think I am not wrong if I assume that the word of physics, on such a matter as this, is the best word of science on the situation.

or compact, is an additional problem. The answer depends on such questions as, *e.g.,* whether it is possible to discover or build up, with the aid of given causes and effects, such entities as abstractive sets. For it is only systems of entities, such as abstractive sets, that are now known genuinely to possess the required infinite divisibility. Ordinary matter of fact events, even excluding quanta, show at most only approximations to such infinite divisibility, as the simplest inspection will make clear. Mathematical continuity or compactness and infinite divisibilty, then, can now be said to apply demonstrably to causal sequences, if at all, only if, in place of matter of fact events, such entities as abstractive sets are discovered and substituted. Now, this first difficulty with continuity assumes that infinite divisibility and mathematical compactness *demonstrably* apply to cause and effect, and it is dialectically ineffectual if it is not allowed this assumption. In consequence, this first difficulty with continuity cannot really touch a merely ontological conception, such as we urge. It might be applicable to a logico-mathematical conception if such a conception be not barred from all application to concrete events by phenomena like quanta; but ordinary ontological events cannot be said to show more than approximations to the stipulated infinite divisibility, on which the difficulty is founded.

The second difficulty is that continuity makes cause and effect homogeneous, destroying all real criteria for distinguishing the two.[40] Now, this again may or may not be true of cause and effect as mathematically continuous, if they are mathematically continuous. But it seems quite inadmissible of cause and effect as concrete events in matter of fact continuity. In the first place, although they pass into each other without a space-time gap, cause and effect are distinguished by existential determination, cause determining effect to exist, but effect not determining the existence of the cause. Indeed, existential determination between cause and effect assuredly holds partly because one passes directly into the other. This allows the one directly to set up the other, hence, indisputably to be its determinant. Secondly, and in consequence of this, cause and effect are distinguishable as earlier and later. One follows the other because it follows from the other.[41] Thirdly, being in sequence, cause and effect are ingredient with

[40] A. E. Taylor, *Elements of Metaphysics*, 8th ed., p. 171 *ff*.

[41] Cause and effect often seem contemporaries, as in Kant's famous example of the hollow in the pillow and the ball. This is due to failure to take cause and effect dynamically, that is, causally. Taken dynamically, as Kant himself argues, they are really successive. The depressing of the pillow exists as a result of the pressing of the ball, and it remains in existence with the pressing so long as the pressing continues to give it existence. Dynamically, one follows from the other, and therefore the two, as cause and effect, exist in sequent order. Cause and effect, dynamically conceived, are often experienced as co-present in the specious present. But this is because the specious present contains succession, and cause gives rise to effect in the experienced moment of succession.

continuants at different stages of continuant careers, and therefore have differences of character, thanks to substantival inter-ingredience. Hence, within matter of fact continuity, one may rightly say that at least existential determination, temporal priority, and qualitative diversity, distinguish cause from effect. The assertion of complete homogeneity of the two here is a fable which the facts do not in the least support.

The second causal problem concerns one-way determinism. Some have tried to shelve causality as a philosophical principle, by accepting one-day dependence or determinism as its essence, then declaring that this involves us in intolerable one-sidedness. A real system, they say, must involve inter-connection in every direction, not mere one-way connection. Hence, causality cannot be held to be an ultimate principle of real systematic structure.[42]

This argument seems to me to have two distinct meanings. It may mean than an event-sequence, as a real system, must have a principle allowing determination in its two directions. We have already granted, however, that causal event-systems have so-called logical determination, or ground-consequent, a principle which allows determination in both directions. But we have seen that this by no means shelves one-way existential

[42] A. E. Taylor, *Elements of Metaphysics*, 8th ed., p. 167 *ff*.

determination. The argument, however, may mean that an event-system, as a real system, actually involves two-way existential determination, so that causality as one-way existential determination must ultimately be replaced by a more comprehensive existential principle. This view is, I believe, erroneous, but certain considerations give it an air of plausibility.

Let us imagine a situation. A ball is thrown at a window near which a dignified elderly gentleman is seated. The ball smashes the window, the elderly gentleman rises in high ire at the boy who threw the ball. Here is a sequence of events. To simplify: throwing of ball, striking and smashing of window, rising of gentleman in high ire. Now, according to one-way existential determination, our objector may point out, the earlier events determine the later, not *vice-versa*. But obviously, if the elderly gentleman, instead of rising in high ire, had risen, smiled, and applauded the boy, such earlier events as the throwing of the ball, would have taken on an aspect most different from the one which they now wear, *e.g.* comic, instead of serious. These events have the character they have on account of the events which succeeded. The fact of later events determining earlier is vividly illustrated by history, where later events often impart an altogether unsuspected significance to earlier events, deflating many

which seemed at the time momentous, magnifying others which seemed at the time trivial.

Parts of this argument seem undeniable, *e.g.* that the value of an event is often visible only after the occurrence of its consequences. But it is difficult to see how this or anything in this argument discredits or replaces one-way *existential* determination. This principle involves the single claim that the coming into existence of an event is determined by an earlier event, not by a later event. It claims nothing regarding the determination of an event's character or value. Now, against this single claim, the above argument seems to me to offer no evidence whatsoever. Thus, the later event, the old gentleman rising and fuming, is not shown to have determined the coming into existence of the earlier event, the throwing of the ball. The later event, indeed, was not in existence, hence not in a position to give existence to anything else, at the time when the earlier event arose. To be sure, the *thought* that the elderly man might act as he did, may have had something to do with the initiation of the causal sequence. But this thought, if it existed, was a thought in the boy's head, not the act of rising and fuming in the gentleman's room, and, as present in the initiating occurrence, if it was, it existed earlier than the throwing of the ball, not later, as did the act in the gentleman's room. Through-

out the situation above described, existential determination is entirely *a tergo.*[43]

The third causal problem concerns the infinite regressus. As a principle explaining events, it is said, causality involves an infinite regressus. Causality explains the existence of Z by referring us to Y, but Y is an event whose existence is no more self-intelligible than Z's, and, if we ask its explanation, causality refers us to X, an antecedent event whose existence again is no more self-intelligible than Z's, or Y's. This series may be prevented from becoming infinite by postulating a First Cause. But this is to abandon causality as a thorough-going principle, since a First Cause has no antecedent, and therefore is inexplicable by causality. On the other hand, remove the First Cause, and we are plunged back *ad infinitum.* In our search for explanation of the simplest event, causality takes us to an event equally unintelligible, and all along the line we meet

[43] S. Alexander, *Space, Time, Deity,* I, p. 287: "we cannot in any real sense therefore say that the future determines the present, for the future is not yet. . . . All causality is *a tergo.*" A. N. Whitehead, *Adventures of Ideas,* p. 251: "there are no actual occasions in the future, already constituted. Thus there are no actual occasions in the future to exercise efficient causation in the present." Both Whitehead and Alexander, here affirming one-way determination, are thinking, of course, of causality as existential determination. The view, that causal events exist in one-way irreversible succession, should be connected with our position on the first or previous causal problem, *viz.,* that causal events are not co-present and spatially separate. The relativity or reversibility of succession assigned to events by current physics, as stated in Chapter IV, section 3, applies only to events which are co-present and spatially separated.

with similar unintelligibles, so that, so long as we stick to causality, we never obtain an intelligible explanation of the existence of any event.[44]

This argument obviously assumes that causality is a principle of explanation. On our own view, this is a misinterpretation. Causality is a principle of existence, not of explanation. Of course, it is true that causality is often used as a principle to ground explanations of existence. Is the above argument fatal to causality even in this regard?

In the first place, suppose an infinite series is required causally to explain the existence of a given event, would the explanation be a mass of unintelligibility, as the above argument asserts? I believe not. The explanation would be an intelligible infinite series. As we have seen, a series is intelligible if some of its terms are known, and the principle of entry of the other terms is given. And this would be the case here. Z, Y, X, some of the terms, are known, and the principle of entry of the other terms, namely, connexion by one-way existential determination, is given. Thus, supposing an explanation of the existence of an event, based on causality, required resort to an infinite series, it would still be an intelligible explanation, since this series would satisfy the demands of intelligibility in regard to series.

[44] A. E. Taylor, *Elements of Metaphysics*, pp. 177-8.

In the second place, a recourse to an infinite series is, I believe, not at all really required causally to explain the existence of any given event. Let us take any given event, *e.g.*, Z. An explanation of the existence of Z, causally grounded, would require reference, it is true, to Y. But all you need to know about Y for explanation of Z's existence, is that Y is an event, and Y is that event whose prolongation is Z. Given this knowledge of Y, and you know why Z should have come to be: it came to be because Y prolonged into Z. Now, this knowledge of Y can be got simply by inspection of the causal situation Y-Z. You need no recourse at all to Y's ancestry, indeed you need to go back in time no farther than the span of Y, nor forward no farther than the span of Z. Thus, if causality is employed as a basis of the explanation of the existence of any particular event, such as Z, you need to return only to its immediate antecedent, Y, to attain a really intelligible explanation of the existence of Z.[45] No doubt, this return still does not explain the existence of Y. But the problem was not to explain the existence of Y. It was to explain the existence of Z. And the existence of Y obviously could be explained in the manner analogous to that in which we have already explained the existence of Z.

[45] A. Schopenhauer, *World as Will and Idea,* Eng. trans., Vol. II, pp. 111-2.

The fourth and final causal problem concerns the selection of cause. To be useful in explanation, the causal principle must provide a basis for the selection of some definite event, or group of events, as cause. To say that the cause of Z is everything, the whole universe, is not worth much. Yet by what right may one say less? Event Z is one piece with all events. Is it not purely arbitrary to select out Y, or $Y \ldots Y_n$, as the cause of Z?

I think not. A cause has certain distinguishing marks, *e.g.* existential determination. A mere co-existent, or a mere sequent, as we have already seen, does not possess these characteristic marks. Nor do events separated from the caused event by other events.[46] Thus, the causal principle does allow us a basis rightfully to eliminate all remote, all sequent, all merely accompanying events, and to thin the ranks to events immediately preceding event Z. Even here, the principle allows us to distinguish between those events which Z merely follows, as day night, and those which Z follows from. Hence, to select Y, or some group $Y \ldots Y_n$ of all events as the cause of Z, is not arbitrary, but based on principle, and secured by objective marks.

The limitation of cause to the immediately preceding event or group of events, seems so contrary to so much

[46] C. J. Ducasse, *Causation*, p. 80.

of common practice, however, that an additional word of explanation undoubtedly is called for.

In common parlance, in history, and in historical sciences, including parts of medicine, the cause of an event is often said to be some remote occurrence. The cause of a war is said to be the forming of certain alliances years before, the cause of a headache is said to be the eating of food an hour ago. Now, this selection of remote occurrences as causes has its justification. In common thought, and in much historical and genetic study, the main concern is with the manipulative controls in a causal chain, with where a sequence might be, or might conceivably have been, shunted into another direction. And from this standpoint, many events in a chain, often including the immediately preceding ones, are not significant. Perhaps they are less open to possible control. In any case, they are not the points where responsibility, correction, praise, condemnation, or any other of the interests of common thought, history, and medicine, seem able to be most effectively focussed. In consequence, these events are dropped from sight in the explanation of the effect, whilst the member or members of the ancestry of the effect which are significant from this practical standpoint, are said to be the cause.

This view of cause as remote is valuable for its practi-

cal suggestiveness. But it is not theoretically precise. Indeed, it is theoretically both inaccurate,[47] and unrequired.

First, it is inaccurate. Neither X, nor W, nor any other remote occurrence actually gave existence to Z. The neglected Y did. Only Y was in a position to do this. The others were out of reach of Z. X may have determined the existence of Y, W the existence of X. But, strictly speaking, this does not make X or W the cause of Z, but X the cause of the cause of Z, and W the cause of the cause of the cause of Z. X and W are causes of Z only in the Pickwickian sense of causing something which caused, or caused the cause of, Z. Cause proper is always a proximate event, or proximate group of events, because a proximate event or group alone is in such position that its prolongation furnishes, or can furnish, existence to the effect proper, which is Z.

Secondly, the view that causes are remote events, besides inaccurate, is superfluous theoretically. In discussion of the third causal problem, we saw that explanation of the existence of Z does not theoretically require recourse to X or W. Y is really sufficient. Of course, this does not mean that from the practical

[47] F. H. Bradley, *Appearance and Reality*, p. 60, sketches the dialectical difficulties of taking merely remote events as causes.

standpoint of control, of desire to fix responsibility and exert correction, remote members of a causal chain may not be most instructive. They may well be. But if they are instructive, it is because Y has been efficient. And if Y has been efficient, we have already in our hands an event really in a position to make perfectly clear at least why Z should be.

5. *Current Physics.*

In section two, I mentioned that so-called logical determination is often said to be causality as understood in science. In physical science, causality is a principle of explanation or prediction, illustrated wherever, from a formula and the values of some variables, you can deduce or predict the values of the remaining variables. A causal law is a "strict 'if . . . then,' that decisive connection which sees a natural quantity B as fixed in its value *if* another natural quantity takes on its determinate value A."[48] This is obviously a quantitative form of the broader logical determination principle. I have already pointed out shortcomings of the broader principle taken as a complete account of causality. The validity of the narrower scientific form has lately been challenged by recent developments in physical science itself.

[48] Hans Reichenbach, *Atom and Cosmos*, Eng. trans., p. 269; italics in text.

The situation, as the physicist sees it, can be illustrated by the following ideal experiment.[49] Imagine a free electron moving over a scale above which a microscope has been conveniently stationed. Suppose you wish to predict or deduce the position of the electron at some future instant t^1. To do this, you must know at least the velocity and the position of the particle at some definite time t. Assume you know the velocity of the particle, but must determine its position on the scale at t. You set about to do this, that is, to see the electron on the scale under the microscope at t. This requires that the electron at t interact with at least one photon or light-quantum, and scatter it through the microscope to the eye. It does this, you see the electron, and note its position at t. Unfortunately, however, in interacting with the light-quantum, the electron receives a slight kick (Compton recoil), and, since the path of the light through the microscope to the eye is indeterminate, the acceleration given the electron by the kick of the light-quantum or photon, cannot be calculated precisely. In other words, you learn the position of the particle at t, only to have the velocity of the particle altered by an indeterminate amount.

Suppose you seek to remedy this, that is, to regain an exact knowledge of the velocity of the particle.

[49] Werner Heisenberg, *Physical Principles of Quantum Mechanics*, Amer. Ed., *passim*.

You measure, let us say, the time of the particle over a marked path on your scale, say A-B. This succeeds, and you re-establish the value of the velocity of the particle at B. Unfortunately, however, in observing the particle under the microscope here, it is given another slight indeterminate kick or dislocation by the light required for the observation. Hence, in the very act of determining the velocity of the particle, you jostle it out of B, so that its exact position has been altered indeterminately at the moment at which an exact velocity for the particle has again become known.

Heisenberg claims that there is no way at present of avoiding this dilemma, that all the exact knowledge necessary for prediction of the future of a microscopic system is not obtainable. Our mode of learning one piece of this knowledge, say, of position, necessarily alters indeterminately other equally necessary pieces of knowledge already in our possession, say, of velocity. "Every experiment destroys some of the knowledge of the system which can be obtained by previous experiments."[50] The general conclusion is that the future of a microscopic system cannot be predicted from the knowledge really obtainable of any given state, and, therefore, that scientific causality, namely, that from the knowledge of any given state of a system and the law of the system's behaviour you can predict the values

[50] Heisenberg, *op. cit.*, p. 20.

of any other state, breaks down. The future is indeterminate, open, uncertain. This is the so-called principle of indeterminacy, or uncertainty principle.

Several comments are required to connect this development in mechanics with the main argument of this chapter.

First, the situation in quantum mechanics does not invalidate, but assumes and corroborates, causality as we have interpreted it. The center of the physical situation is a quantitatively indeterminate alteration of the position or velocity of the particle. This is conceived as due to the kick of a photon. That is, it is assumed that you have one event, a kick, which determines another event, a quantitatively indeterminate alteration, to exist. Thus, causality as existential determination of event by event, is assumed and acknowledged to rule at the very heart of the physical situation.

Nor does the present situation challenge the broad principle of logical determination except in one of its sub-forms, namely, quantitative determinism among the microscopic. Moreover, it challenges it here merely because on present experimental methods sufficient exact information is never obtainable at a given time to employ it. And physicists are by no means unanimous that this constitutes a permanent set-back. Max Planck, who formulated the original quantum hypothesis,

writes:[51] "I firmly believe, in company with most physicists, that the quantum hypothesis will eventually find its exact expression in certain equations which will be a more exact formulation of the law of causality." Einstein says: "The indeterminism which belongs to quantum physics is a subjective indeterminism."[52] James Murphy writes: "It (the present situation) means that we cannot detect its (causation's) operation; because, as things stand to-day, our research instruments and our mental equipment are not adequate to the task."[53] And Alfred Stock says: "The present speaker holds with those investigators who assume that the law of causality governs the field of the infinitely minute, and that only our methods of observation and measurement are still too coarse to enable us accurately to trace the causes and effects of these phenomena."[54]

Whilst strict quantitative determinism in the field of the microscopic is at present out of the question, so-called logical determinism in its non-quantitative form, *e.g.*, if kick of electron by photon, then alteration of electron, still remains. Moreover, probability determinism, or so-called statistical causality, which is, like strict scientific causality, a quantitative sub-form of logical determination, is also possible among the micro-

[51] *Where Is Science Going?*, Eng. trans., p. 143.
[52] Planck, *op. cit.*, p. 202.
[53] Planck, *op. cit.*, p. 32; parentheses mine.
[54] *The Present State of the Natural Sciences, Science*, 1932, p. 347.

scopic. The present values of a system can be determined and its future values, such as position or velocity, predicted within a range of probability. In technical language, so-called statistical causality is summed up as follows: "The initial conditions of an atomic system are not precisely determinable. The elementary quantum processes are symbolized by a probability function. However, the probability function is determined by a differential equation of the type of the classical physics of fields. Hence if the initial values of the probability function are known throughout a region and if the values over the boundary are controlled during a certain interval of time, then the probability function is determined throughout the region during the given time interval." [55]

Finally, this restriction of strict scientific determinism to statistical law is not new in science, except that it sets mechanics in its treatment of the very tiny back to the epistemological level of certain less advanced sciences. Planck writes: "the majority of physiological laws are of a statistical character." [56] And Einstein says: "The method which is being used in quantum physics has already had to be applied in biology, because the biological processes in nature could not in themselves be traced so that their connection would be clear, and

[55] V. F. Lenzen, *Physical Theory,* p. 295.
[56] M. Planck, *op. cit.,* p. 147.

for that reason biological rules have always been of a statistical character. And I do not understand why so much pother ought to be made if the principle of causation should undergo a restriction in modern physics, for this is not a new situation at all."[57] In the treatment of the minute, the statistical method has always been, not the exception, but the rule. The chemist says that the atomic weight of oxygen is 16. But this has never meant more than that atoms of oxygen on the average, and treated in large groups, have this value, not that every individual oxygen atom as such necessarily has exactly this value. The value is a statistical average.[58]

The present situation in quantum mechanics has roused widespread popular interest, probably because the principle of indeterminacy or uncertainty has spiritual affinity with certain factors in the current *Zeitgeist.* So far as causal transactions go, however, the situation leaves undisturbed all those general elements sketched above, existential determination, irreversible succession, so-called logical determination in its broader form, and so on, and it reveals no more in this connection than that what has always been true

[57] M. Planck, *op. cit.*, p. 209.

[58] A. N. Whitehead, *Adventures of Ideas*, p. 143: "It is now the opinion of physicists that most of the laws of physics, as known in the nineteenth century, are of this (statistical) character." Parenthesis mine.

of less advanced sciences in the treatment of the very tiny, is also at least temporarily true of the oldest and the most advanced of natural sciences of modern times, namely, mechanics.

CHAPTER VI

Teleology

1. *General Theory.*

Causality, then, is irreversible existential determination which allows so-called logical inter-determination between states and events. And causality is implied in events. There is causality because events have outcomes and prolongations. Since events are ubiquitous, this means that causality is ubiquitous, or, that causality is a pervasive principle of matters of fact.

This doctrine, that matters of fact constitute a causal system, is customarily called mechanism. A causal system is called a mechanism, probably because cause determines effect as the motion of one part of a machine determines the motion of another part. In any case, the ensemble of matters of fact as a causal system, is called a mechanism. And the doctrine that the world is a mechanism in this sense, is, I believe, correct, so long as it is not combined with the dogma that the world is merely a mechanism. This dogma is erroneous. And it is certainly no part of our position. On our view, causality is, like space and time, an ontologi-

cal relation which governs over prime terms throughout matters of fact. But other relations, such as logical relations, govern throughout fact even more fully than causality. And causality is only one of many pervasive ontological relations. It is neither all-inclusive, nor exhaustive. Indeed, the theme of this chapter is that there is at least one more pervasive ontological relation in addition to those heretofore discussed, namely, teleology.

In modern thought, the belief is widespread that mechanism is incompatible with teleology. Some versions of mechanism and teleology demand this belief. Most of them, certainly the ones which we shall recognize as fundamental, do not. Consider an ancient theory of teleology, teleology as finality. Interpreted in a certain way, this is entirely compatible with efficient causation. Of a phenomenon, such as the movement of the heavenly bodies, one may ask: how does it occur? what is the mechanism of its movements? But one may also ask: what value does the phenomenon have? what good do these movements achieve? This is one possible distinction between efficient and final causes. In answer to the first question: what mechanism? one might reply: gravitation. In answer to the second question: what good? one might reply: these movements serve to keep the earth and its inhabitants in a cosmic environment suitable to life, or, these move-

ments beautifully illustrate the Newtonian theory of gravitation, and so on. Sometimes, it is said that modern natural science began with the rejection of final causes, and devotion to efficient causes, particularly their mathematical formulation. This is a very broad statement, probably requiring considerable qualification, since 'final causes' has several meanings, and logico-mathematical structure, not efficient causes, most occupied such originators of modern physical science as Copernicus. In any case, these scientists did find phenomena important and valuable for their scientific purposes. That is, they discovered finality in the sense of scientific value in phenomena, as they traced out efficient causality, or, insofar as they did. In general, in a universe such as ours, which contains man, there is no reason why, in addition to having an efficient cause, any phenomenon might not serve a theoretical or a practical purpose, hence, have value. At least, efficient causation does not preclude such finality, and would exist entirely intact if such finality existed.

A recent theory illustrates, as plainly as this ancient theory, the harmony of mechanism or causation and teleology. This theory interprets teleology as means-end structure. That is, if a system is such that its parts are related as means to end, the system is teleological. Now, every causal system is teleological in this sense. The cause is a means, namely, the active instrument

which brings on the existence of the effect, and the effect is the consummation of the cause, the end toward which the cause is tending and leading. Thus, wherever there is causal structure, mechanism, there is means-end structure, teleology. The one involves the other. "There is obviously no antithesis between the two points of view," Morris R. Cohen writes, "if one remembers that when A is the cause of B, A is also the means of bringing about B as end."[1]

The general theory of teleology which I wish to stress most in this chapter is neither means-end structure, nor finality. It is selectivity. Selectivity is a principle of continuants, as causality is a principle of events. And I wish to stress selectivity, both to parallel the stress on causality in the previous chapter, and to indicate that mechanism can be said to be as harmonious with teleology as events with continuants.

Continuants are strands of inheritance amid flux or events, as we have seen. The events bring on novel states in continuants, and determine the existence of these states, according to causation. But the character of these states is determined by the continuant material. The emergent states will only be states of a character allowed by the continuant material. For example, there are many things which my table will not be upon interacting with a hammer, *e.g.* a canal in Mars, Queen

[1] *Reason and Nature*, p. 342.

Anne, *etc.* The nature of the table will exclude a boundless wealth of possibilities from characterizing it. At the same time, what the table will be, is dependent on what its material nature, amid the operative events and circumstances, will allow it to be. This is selectivity. Selectivity is the exclusion by a continuant of a boundless wealth of alternative possibilities, and the inclusion of only those elements and characters which the nature of the continuant, amid the operative events and conditions, allows.[2] Causality and selectivity work together. Causal events bring into existence continuant states. But events can bring on only what the materials undergoing transformation allow. They cannot stretch the materials in any direction. The determinate present restricts the determinate future. At the same time, this restriction requires causation of the future to operate. No future, no selection of the future. Thus, the two principles work hand in glove.

Selectivity is a principle of qualitative individuality. It grounds the qualitative determinateness of the future on the peculiar nature of the material in a configuration. Selectivity is also a principle of self-determination. In previous chapters, I have called it self-determinacy. It means that the inner nature of a continuant at any

[2] A. N. Whitehead, *Nature and Life,* p. 27: "By this term 'aim' is meant the exclusion of the boundless wealth of alternative potentiality, and the inclusion of the definite factor of novelty which constitutes the selected way of entertaining those data in that process of unification."

time itself determines the character which the continuant will show.

This self-determinacy is compatible with considerable passivity and openness to transeunt influence. It does not require continuants to be sealed, monadic. Character remains selected where modification originates entirely transeuntly. A soft-wood table whacked by a hammer is deeply dented. The denting plainly was brought into existence by the whacking of the hammer; its existence originated transeuntly. Yet the character of the dent, the deepness, was determined by what the nature of the table, amid the causal events here, allowed. This is most evident if one supposes the same force and a hard-wood table. The dent would be slight. The different characters of the two dents is seen to be based on the different natures of the two continuants. Each character is what each nature, under the circumstances, allowed. Passivity, then, is not incompatible with selectivity. Self-determinacy does not require self-causation, monadism. It is harmonious with wide openness to transeunt influences.

Selectivity is also compatible with unpredictability of specific qualities, so-called pure emergence. No one may have been able to say what the properties of a combination of hydrogen and oxygen would be until he combined the two elements. Still, the properties which arose in the combination, were what the ma-

terials allowed in combination. They were selected. Selectivity predicts, not the specific nature, but the general nature of continuant qualities. It says that generally qualities must conform to what is allowed. But it does not say what specifically is allowed. Hence, selectivity may co-exist with any degree of ignorance of the specific nature of the future.

Selectivity does not necessarily require that continuants have natures which last unaltered throughout time. Development is not unfolding of the pre-formed. The original continuant nature may alter in at least two ways under selectivity. First, new material may enter a route, since original material often allows combination. Now, all combination contributes a quota of quality, an enlargement of nature, not in the original material by itself. Second, novel quality, arising independent of combination, also may enter a route under selectivity. The quality was not there before. The table was not dented before whacked. But the dent was allowed. And once this novelty is allowed, it belongs to the individual continuant nature. It constitutes a difference in this nature, controlling the future. Selectivity, then, is compatible with considerable alteration of nature. At least, it does not require that continuants have natures which last wholly unaltered throughout time.

Selectivity also does not require consciousness. For

example, my table is selective. In general, all continuants exhibit that capacity for restriction of novelty by inherent traits, which is selectivity, a hammer no less than a higher organism. On the level of mind, it is true, selectivity has peculiar characteristics. Here, the nature restricting novelty often figures in consciously directed events. Hence, the character of the continuant future is not only moulded from within, or selected, but moulded, as the saying is, nearer to the heart's desires.

On the level of mind, selectivity raises the problem of mind and body. Conscious selectivity is self-purpose, mind partaking in the mastery of the future of a continuant which includes a body. How is this psycho-physical situation to be interpreted? The mind-body problem also comes on the horizon at the end of an attempt to trace the special theories of teleology in the philosophy of physics, biology, and psychology. I propose to describe some of these special theories of teleology, before passing to the psycho-physical problem where selectivity will receive further illustration. Each special theory of teleology will be compared with a parallel theory of mechanism. Special theories of teleology, as of mechanism, are quite numerous, and some which I shall discuss, are not derivates of our general theories of teleology and mechanism, namely selectivity and causality. The discussion even of these

however, will have an indirect bearing on our general argument by the light it sheds on the broader issue of the conflict between mechanism and teleology.

2. *Special Theories.*

In the philosophy of physical nature, an outstanding teleologic theory is that the physical world has been prepared so that living beings, including man, might appear, and survive within it. The whole has been designed.[3] Parallel to this is a theory of mechanism, equally old and occasionally revived, that "all physical phenomena are to be interpreted as manifestations of mechanical force and the motions of bodies."[4] Design is not required.

The teleologic theory here is based on the certified physico-chemical fact that the earth and its environment are composed of such materials and conditions, nitrogen, oxygen, temperature, and so on, that they are suitable for sustaining life. This is the fact. Does design follow? Cohen writes: "Consider the many seemingly exceptional physico-chemical conditions necessary to make life possible. The odds against such a combination occurring by chance are enormous. Hence, it is concluded, some designing agency is more prob-

[3] L. J. Henderson, *The Fitness of Environment,* and *The Order of Nature.*

[4] V. F. Lenzen, *Physical Theory,* p. 2. Lenzen himself does not hold this theory.

able. This argument, however, is extremely unfortunate. For even if we were to grant the validity of its mathematical reasoning, the latter could prove nothing more than that in a chance universe spread through space and time, the occurrence of life should be extremely rare. That, however, is precisely the actual case. Life as we know it is a relatively recent episode in an infinitesimal part of space. Even on our tiny globe it occupies a minor part. We do not find it a few miles below the surface of the earth and it disappears a few miles above it."[5] In other words, probability does not require the introduction of an extra-physical designer. So far as our knowledge of the extent of life goes, its environment might well be just as it is without design, or a designer. Teleology in this first sense is superfluous to explain the facts of life's environment.

Mechanism here is in conflict with teleology. But the conflict is unimportant, because mechanism is as inadequate, as teleology is superfluous. Mechanism here is but a summary of the findings of seventeenth century physics, pointed up to conflict with the design argument. As a summary of physical findings, it is now outmoded. Since the seventeenth century, our knowledge has expanded so that the physical realm is now said to include, not merely motion of bodies and

[5] M. R. Cohen, *Reason and Nature*, p. 290.

mechanical force, but phenomena such as electromagnetism, and electric charge. Indeed, many physicists advocate an electro-dynamical concept of physical reality, and set aside the mechanical concept completely. Cohen has examined with some care the rational arguments for mechanism in the present sense, and shown them to be as unconvincing as the empirical evidence is outmoded. His conclusion is that all arguments to reduce the physical realm to the motion of bodies and mechanical force, "turn out to be vain."[6] The general theories stated in section one of this chapter seem adequate to cover the teleologic and mechanistic manifestations in physical nature. Special theories seem to be either inadequate, or superfluous.

In the philosophy of the biological realm, two special theories of teleology require attention.

According to the first, teleology is the theory that the evolution and behaviour of organic beings is determined by an inner factor, an *élan vital,* or, entelechy. Vital selectivity and complete immanent causation are the mainsprings of organic history and action. Environment has a purely passive role. The theory of mechanism parallel to this is that the evolution and behaviour of organic beings is determined completely by environment. Natural selection explains all.

Against mechanism here, the presence of evolutionary

[6] Cohen, *op. cit.*, p. 216.

and behaviour determinants internal to the organism, such as the genes, has been demonstrated with high probability. In any case, as Cohen remarks, natural selection "does not explain the causes of variation."[7] If anything, it explains why variations which somehow arise, survive, *viz.*, they survive because adapted. Indeed, natural selection does not even wholly explain their survival, since, as Cohen says in the same passage, it is not true "that every trait of an existing organism makes it adapted to its environment. Many traits are indifferent to survival-value and many that are injurious nevertheless persist."

Against teleology here, or, pure vitalism, the case is also fairly strong. The denial of effective transeunt causality, or, environmental influence, seems contrary to fact when applied to the total known evolution and behaviour of organisms. Of course, organisms, as all continuants, exert selectivity. But certainly this often operates under the play of controlling causal events originating elsewhere, *e.g.* in physical cataclysms. The hypothesis that 'life' alone is the 'active' and 'determinant' factor in biologic action and evolution, seems, to say the least, a gross exaggeration. As to the vitalist's special theory of 'life', the entelechy, or the *élan,* Cohen claims that no major empirical factor of organic action supposedly explained by it, cannot be equally explained

[7] Cohen, *op. cit.*, p. 287.

without it.[8] Moreover, since the entelechy or the *elan* is quantitatively indeterminate by stipulation, the vitalistic theory of life "dogmatically (as well as gratuitously) blocks the path of rational physical research" in biology.[9] The truth between environmentalist and vitalist seems to lie in a theory which allows an important part to both inner and outer factors, such as we allow to continuant individuality and relationality in our general world-theory. Such a theory would also avoid, as we do there, the introduction of hidden, unnecessary, and complicating factors, such as entelechies.

In the philosophy of biology, teleology has another meaning besides pure vitalism. Teleology is the theory that organisms exhibit a peculiar means-end structure, so-called 'organization'. The processes of organisms, such as the circulatory, the respiratory, the digestive, the nervous processes of higher animals, are so organized that they are means to the maintenance of the whole as end. They exist in a peculiar intimacy with the whole, subserving its life needs. Parallel to this is the mechanistic theory that biological processes are always physical and chemical processes, and can always be described by the so-called causal laws of physics and chemistry.

I believe that these theories do not necessarily con-

[8] Cohen, *op. cit.*, p. 249 *ff*.
[9] Cohen, *op. cit.*, p. 282, parenthesis mine.

flict. All the processes in organisms may be describable physico-chemically. Yet these processes may still have the type of general structure here called 'organization'. Indeed, this seems to have been established to some extent as a fact. Respiration can be described physically, oxidation of the blood chemically. Yet, as R. F. A. Hoernlé has pointed out, "the physical process of inflating and deflating lungs, and the chemical process of oxidising the blood, are subservient to, are means for securing, an effect which is 'beneficial' to the organism, or, in other words, a necessary element in its total self-maintenance."[10]

Both theories, it is true, have difficulties to overcome, limiting the significance of their compatibility. Thus, the detailed processes within organisms are yielding more and more to physical and chemical methods, but many remain which have not yet yielded to satisfactory physico-chemical description. Against teleology here

[10] *Studies in Contemporary Metaphysics*, p. 163. J. S. Haldane, who has done important scientific work on respiration, is a teleologist in this second sense. And Cohen, who defends biologic mechanism in this second sense, writes: "mechanists admit that in biology we have to deal with another element besides chemistry or molecular structure. Even as extreme a mechanist as Loeb insists that 'without a structure in the egg to begin with no formation of a complicated organism is imaginable.'" "In truth, if the vitalist (teleologist) were satisfied to insist that the older and simpler ideas of physics and chemistry will never be adequate for biology, and that the latter needs an additional category such as structure, form, or organization, there would be no serious issue between him and the mechanist." *Reason and Nature*, p. 172; p. 173; parenthesis mine. *Cf.* L. J. Henderson, *Order of Nature*, p. 67; H. R. Smart, *Logic of Science*, p. 158.

stand those many strange growths in organisms which do not seem clearly subservient to the organism's life needs, *e.g.* the two or more lenses developed in the eyes of newts and salamanders, the two tails in lizards, the regeneration of the head of earthworms after removal of anterior end and reproductive region, the development of a different organ, such as a tail, to take the place of a removed organ, such as an eye, and so on.[11] Perhaps, such phenomena can somehow be harmonized with the teleological principle by invention of skilful qualifications. But this harmonization is, at the present time, a *desideratum,* not yet an accomplished fact.

In the philosophy of psychology, the most important special theory of teleology is, I believe, that conscious purpose and idea make a difference. They count for something in the action and existence of those beings who have them. Mechanism has various meanings. Radical mechanism is the theory that conscious beings are wholly physico-chemical, and that conscious purpose and idea are chimera which count for nothing in action and existence. Idea and purpose are inconsequential irrelevancies. This theory of mechanism, plainly at odds with teleology here, seems equally at odds with countless deliverances of actual experience, where idea and purpose appear to count for a good deal. In particular, the theory appears to conflict with

[11] Cohen, *op. cit.,* p. 274.

one's experience of radical mechanists, whose practical activity and philosophical discourse often seem markedly directed by their mechanistic ideas. In addition, radical mechanism seems at odds with itself, since, if we hold that ideas are chimera which make no difference whatsoever, we must hold that the idea of radical mechanism is a chimera which makes no difference whatsoever. Radical mechanism is, as Arthur Lovejoy says, "a . . . self-stultifying idea."[12]

At least two less radical versions of psychological mechanism exist. The first holds that human and animal actions obey causality and causal laws. The second holds that human and animal existence obey physico-chemical laws, incidentally suggesting that psychology should devote itself merely to tracing the workings of these laws. Psychology should be a 'natural' science. This last may be what psychology ought to be, but it is hardly what psychology universally is. Still, the main theses of these two mechanistic theories seem to me correct. And I think both are compatible with the teleology just described, which I believe is also correct. To show that this compatibility holds, particularly to show the place of purpose in human existence, raises again the psycho-physical problem. The difficulty is to see how conscious idea and causation, fore-plan and physical formulae, here go together.

[12] *Pragmatism as Interactionism, Jour. Phil.*, 1920, p. 632.

And this is merely another form of the difficulty of seeing how mind and so-called physical body go together. Thus, by discussion of special theories of teleology, we are led back to the problem to which the general theory of teleology as selectivity brought us.

I propose now to discuss the psycho-physical problem. I will discuss the problem as it pertains to man. The application of our views to other animal existence will depend on how far other animals may be said to have consciousness, mind, and purpose, approaching those of man. This is a moot question of detail, which may well be set aside, not only because it is controversial, but mainly because it is not particularly vital for making clear our general position. First, I will review the traditional solutions of the mind-body problem. This will provide orientation. Then, I will state a different solution which seems to me considerably superior to any of the traditional positions.

3. *Traditional Solutions.*

The leading traditional solutions of the psycho-physical problem are epiphenomenalism, parallelism, and interactionism.

Epiphenomenalism is the theory that mind is an accompanying by-product, or epiphenomenon, of bodily changes. Bodily changes occur in all cases, as if mind were non-existent. But as these changes occur, they

throw off a shadow which mirrors faithfully the bodily changes, but is otherwise ineffective. This shadow or ineffective reflection of itself, cast off by materio-vital process, is mind, or consciousness.

Epiphenomenalism has been subjected to considerable criticism,[13] has little vogue to-day, and requires only brief treatment. Perhaps, its chief defect is its view that mind and mental content are merely passive reflectors, shadowing given existence, not at all determinant of the future. This view seems contrary to manifold ordinary experiences wherein ideas and purposes in mind seem to make a great difference in the character of the states and actions which ensue. The epiphenomenalist might sweep this testimony aside as vulgar error. But the character of this action would plainly have some connection with the idea of epiphenomenalism in his mind. That is, the action would only confirm the testimony against his view. Despite its many crudities, which Ward and others have pointed out, epiphenomenalism contains, I believe, at least one valuable insight. This is that ideas and purposes are not physical causes, nor causes in the strict sense at all. They do not give *existence* to what ensues. This view, which we shall argue is correct, is combined in epiphenomenalism with the view that ideas and purposes do not have any effec-

[13] James Ward, *Naturalism and Agnosticism,* p. 330 *ff.*, contains a detailed criticism.

tive role at all. They are merely passive shadows which bake no bread. This position seems empirically untenable, and dialectically contradictory, as I have just said.

Parallelism denies that bodily changes cause mind to exist, *i.e.,* epiphenomenalism. But it also denies that bodily changes cause events in a pre-existing mind, *i.e.* interactionism. According to parallelism, there is no causal connection at all between body and mind. Mind and body are two distinct and separate systems which, like Euclidean parallels, never meet. Mind and body are parallel in another respect. Corresponding to every mental event, there is a neuro-cerebral event. Corresponding to every neuro-cerebral event, there is a mental event. Every psychosis its neurosis, every neurosis its psychosis. Such is the general parallelistic doctrine. Why accept it? The main arguments for parallelism are three: the physiological, the dialectical, and the methodological.

The physiological argument is based on studies of the brain and nervous system, which show increasingly a correspondence, as the parallelist argues, between mental and neuro-cerebral structure, and functioning. Definite regions of the brain are known to be correlated with definite sensations, such as those of sight and touch. Injury of brain areas is accompanied by loss of memory. Association of ideas seems to be correlated

with brain traces. Such evidence points to a detailed correspondence between psychical and neuro-cerebral structure, and functioning, and, as science advances, we may confidently expect this correspondence to become a completely demonstrated fact.

Unfortunately, even if all this were true, it would be completely compatible with interactionism, as advocates of this doctrine have pointed out. Indeed, this correspondence is precisely what one would expect, if the two systems were constantly interacting and adapting themselves to each other. Accordingly, the parallelist steps aside at this point to deliver a body blow at his great rival. This is the second argument, the dialectical, which aims to exclude interactionism. It claims that interactionism is unacceptable, because it violates certain unshakeable foundational principles of physical science, *e.g.* the law of the conservation of energy.

This law asserts that the physical energy of the universe is constant in quantity, that no new physical energy is created, and no old energy destroyed. Now, interactionism asserts that mind causes physical changes, *i.e.* that physical energy is increased from outside. It also asserts that physical changes cause mental events, *i.e.* that physical energy is lost to physical nature, becoming non-physical. In other words, interactionism asserts that physical energy is both destroyed

and created, and therefore violates the First Law of Energy on two counts.

The reply of interactionism is that the law of conservation, as a principle of physics, is not an unshakeable truth, but a postulate.[14] Moreover, as a postulate, its utility is now being questioned, *e.g.*, by certain recent speculations of Einstein. In any case, so far as it has been verified at all, the First Law is only a statistical law: it means merely that the ingo and outgo of energy of a system is approximately equal in quantity over the long run. Now, there is no reason to believe that interactionism violates the principle in this form. Suppose interactionism asserted, as the parallelist claims, that in the system which is the body a certain amount of energy is created by mind, and a certain amount is lost to mind. Over the long run, these amounts might be approximately equal in quantity, and the system conservative. Indeed, experiment shows this to be the case.[15] Interaction might go on in the form which the parallelist attacks, yet the physical system which is the

[14] J. B. Pratt, *Matter and Spirit,* pp. 149-50.

[15] J. B. Pratt, *op. cit.,* p. 150. Precisely, the Atwater experiment, and others, simply show that the ingo and outgo of physical energy of human beings is approximately equal over time. It is an inference compatible with these results, that the amount of energy, if any, created by mind equals the amount of energy, if any, lost to mind. Equally compatible, however, is the inference that mind neither creates nor destroys physical energy, but allows it simply to remain quantitatively constant. That is, the experiments do not prove interactionism in the present sense, although they do show that this interactionism is not necessarily contradictory statistically to the First Law.

human body might still be statistically conservative. In sum, interactionism does not violate the First Law in the form in which it has been verified. And in any other form the law certainly cannot be introduced into the psycho-physical discussion as an unshakeable premise, as the parallelist naively assumes.

The third argument for parallelism is the methodological. Parallelism provides autonomy to the various sciences. It allows absolute reign to the laws of the physical sciences, since it holds that the realm of body exists as if the mind were non-existent. It allows absolute reign to the laws of the mental sciences, since it holds that the realm of mind exists as if the body were non-existent. This dual provision gives parallelism an edge as a methodological principle of research. Epiphenomenalism provides for the complete reign of physical law, but at the expense of degrading mind to an ineffective shadow. Interactionism provides for the efficacy of mind, but at the expense of allowing mind to interfere with and alter the uniform operations of physical law. Only parallelism gives both physics and ethics, physiology and psychology, the autonomy and independence required if these enquiries are to have any founded hope of attaining fixed unsuspendable truths about their subject-matters.

It is easy to see that this argument does not prove parallelism true, but, at most, how nice it would be

for the sciences if parellelism were true. The sciences would be guaranteed an independence which they presumably hope for and desire. In the eyes of a scientist, this might momentarily incline the methodological decision toward parallelism. But the decision in philosophy would remain wide open until more information was forthcoming, for many theories from the Aristotelian substance theory of physical nature onward have guaranteed the fulfilment of some prevailing scientific hope, only later on to be shown to be inadequate philosophically. Moreover, prevailing hopes in science, desirable as they may seem at the time, often turn out to be ill-founded. To promise their fulfilment therefore might just be to promise something which amounts to nothing. And even if these hopes were well-founded and amounted to a great deal, as they probably do here, they might be permissible, for all the above argument shows, on some psycho-physical solution not traditionally recognized, which is, I believe, the case. Hence, their permission by parallelism cannot be said at this stage, to establish this theory as superior, even methodologically.

The three arguments, then, do not prove parallelism. The first is compatible with and even favorable to interactionism. The second, even if it were completely successful, as it is not, would not prove parallelism right, but interactionism wrong. The third argument is

similarly inconclusive. And if there are no decisive arguments in favor of parallelism, there are many unfavorable. For example, parallelism makes the twofold assertion that mind and body are entirely distinct and separate, and that mind and body are in detailed one-one correspondence. Both parts of this assertion are essential to parallelism. Yet, if the first part is granted, the second is unintelligible.

Suppose that mind and body are two entirely distinct and insulated beings. How explain their detailed one-one correspondence? If the two beings were of the same kind and subject to similar conditions, their one-one correspondence would seem natural, at least to a certain extent. Or, if the two were related by interaction or some other direct relation, their one-one correspondence would seem explicable by familiar principles, *e.g.* mutual adaptation. But here the two are absolutely different in kind and condition, and go their way with absolutely no inter-influence or direct connection. Their detailed one-one correspondence, therefore, seems a miracle. This point is only enforced by consideration of the traditional parallelist's mode of explanation. God, says Leibniz, pre-arranged the world so that events in the mind would have correspondents in the body. God, says Spinoza, manifests himself equally in extension and in thought, in body and in mind, hence, whatever occurs in one will have a coun-

terpart in the other. But such modes of explanation only leave the miracle standing, as unintelligible as it was before. A recourse to omnipotence is really a confession of impotence, namely, it is a confession that one has no specific explanation of a phenomenon at all. Because he can do anything possible, an omnipotent God, such as Leibniz's or Spinoza's, can be used equally to explain anything possible. He can be used equally well to support any one of a number of abstractly coherent alternatives, and therefore is really no decisive support of any one alternative which has no cogent support without him.

Perhaps, the most widespread psycho-physical theory of all is interactionism. This holds that mind and body are two distinct systems, processes or things, which act on each other. The mind causes physical changes in the brain, thence throughout the body. The body *via* nerves and brain causes psychical changes in the mind, or, consciousness. Mind and body are two different substances or substantives, which interact constantly.

This theory has a strong appeal to persons who are convinced that man's will and thought can count in the attainment of the good life, that man can control his body and the course of his immediate physical action, and that man is not wholly the prey of merely external determinations. Moreover, the theory seems to summarize a vast quantity of ordinary experience,

typified by a decision being followed by a movement of muscles and other motor parts, and the extinction of a light being followed by a sensation of darkness. Any psycho-physical theory which is to be adequate at all, must somehow fit all such facts convincingly into its scheme.

Still, interactionism is beset by a grave difficulty. Interactionism conceives mind and body as two radically different types of being. As the founder of modern interactionism, Descartes, put it: body is extended, inert, mechanical; mind is unextended, active, non-mechanical. The two have nothing in common. At the same time, interactionism conceives mind as producing physical consequences in the material realm. Descartes, for instance, conceived mind as swerving the pineal gland. How can mind produce physical motion, or change its direction? Some interactionists, seeing the difficulty, have endowed mind with physical energy, and conceived its operations as part of a system of universal mechanics.[16] But as Pratt, an ardent interactionist, writes: "I doubt whether this bringing of mechanics into the soul will be acceptable to many interactionists."[17] The truth is that when mind is endowed with physical energy or made quasi-physical, the vaunted ef-

[16] Stumpf, *Eröffnungsrede des Internationalen Krongresses für Psychologie*, München, 1908, p. 19, cited by J. B. Pratt, *Matter and Spirit*, pp. 142-8.

[17] Pratt, *op. cit.*, p. 148.

ficiency of mind is made to reside in that part of mind which is not mental.

In its characteristic form, then, interactionism keeps the mind purely mental. That is, interactionism is dualistic. Yet how make mind's action on body intelligible within radical dualism? [18] Pratt suggests endowing mind with power to create energy.[19] But how mind can create energy out of itself, out of matter, or out of nothing, is not very clear. Moreover, the question still remains how mind, which is in no way physical, can manipulate energy however created. How can mind act on energies however derived? This question, which is the real question at issue, is not touched at all by the undemonstrated assertion that mind can create energy. And the question seems answerable, if at all, only by conceiving some sort of community of character between body and mind, for instance, by conceiving mind as acting in space, that is, being a spatial force, which is in violation of strict dualism.

I conclude, as successors of Descartes long ago concluded: either interactionism, or dualism. Not both. Traditional interactionism in its most widely accepted form says both. But with both, at least as much mys-

[18] Or body's action on the mind. N. K. Smith, *Studies in the Cartesian Philosophy,* pp. 15-16, comments as follows: "it (interaction of brain on mind) is contradicted by the fact that, while the only form of action conceivable in matter is impact, no impact can be given to the immaterial." Parenthesis mine.

[19] Pratt, *Matter and Spirit,* p. 148 *ff.*

tery is introduced into the situation as is explained away, hence, no successful advance is made with the psycho-physical problem.

4. *Proposed Solution.*

The solution of the psycho-physical problem which I propose is based on the elimination of the view of mind prevailing in the philosophical tradition just reviewed. This tradition conceives mind as a substantive: a *res cogitans,* a monad, a system of processes, a shadow of a system of processes, a so-called mode or fragmentary part of God, etc. I think that this conception of mind is at the root of the stalemate which we have found in the philosophical tradition. Now, on the psycho-physical view I propose, mind will not be conceived as a substantive,[20] but as a quality, a complex quality. The substantive involved, at least so far as man is concerned, is neither body, nor mind, but the person. And mind is a complex attribute, the sensitivity, the reflectiveness, the purposiveness, exhibited by persons.

I will not speculate on the absolute origins of mind, if any. It is enough for our purposes to understand mind as it is in the small distinctive animal group in which we now find it. Mind here is an emergent quality. Living materials attached to minded organ-

[20] *Cf.* W. James, *Essays in Radical Empiricism,* the essay entitled *Does Consciousness Exist?*

isms become fertilized, and, in the course of sequent re-organization, allow or select a new pervading type of definiteness. At what exact point subsequent to fertilization this determination appears, is a moot empirical question which we need not decide. But the living materials, at least as offspring, show a complex quality not to be found in pre-fertilization stages. It did not pre-exist, yet it does show itself in the re-organized materials, controlling characteristics of the continuant future. This definiteness, this complex of sensitivity, reflectiveness, and purposiveness, is mind. And the living material as re-organized to show this definiteness, is, so far as man is concerned, the person. Mind is not a thing. Bernard Bosanquet writes: "Mind is not so much a something, a unit, exercising guidance upon matter (the interactionist view), as the fact of self-guidance of that world (a being) which appears as matter, when that reaches a certain level of organization."[21] Similarly, the person is not a combination of two substantival units, mind and matter, but a single substantive which possesses the complex characteristic of mind. I believe that this view of mind and the person is consistent with all the general facts, as well as requisite for proper solution of the psycho-physical question.

One consequence of our view of mind and the person

[21] *Individuality and Value,* pp. 193-4; parentheses mine.

which ought to be mentioned at once, is that there are no purely mental events. Events always derive quality from the ingredient continuants. Hence, all so-called mental events are really personal events. Events may have mental quality, since the person has. But no event has merely mental quality, but always in addition physical quality.[22] The personal events which have mental quality always involve brain. I propose to call these psycho-physical occurrences central events. And for convenience I will call the system which includes brain and mind and consciousness, the central system.

The conception of the psycho-physical situation which I propose, employing this view of mind and the person, perhaps can be explained most easily by an illustration. I will use a favorite illustration of the interactionist, since this will permit us at once to compare our psycho-physical solution with the most accepted of the traditional positions. The illustration is a decision resulting finally in the movement of the arm. According to interactionism, what takes place is roughly this. You have a decision, a purely mental event, occurring in the mind substantive. This somehow agitates the brain, or, manipulates energy which agitates the brain, producing motions or physical changes there, and these continue into the neural sequence which culminates in

[22] F. Matthias Alexander, *The Use of the Self:* "The 'mental' and 'physical' are not separate entities. . . . Human ills and shortcomings cannot be classified as 'mental' or 'physical.' "

the movement of the arm. The difficulty is to see how a decision, if purely mental, can itself ever agitate a system held to be not the least bit mental, or, can manipulate physically efficacious energy. How can a decision, if not at all physical, act as if it were a physical force?

On the theory proposed here, this sort of action is exactly what does not take place. In the case cited, the initial member of the causal chain, the theory holds, is not a purely mental event. It is a central event. You may call it a decision, if you like. But as an event it is as much physical as psychical, involving brain every bit as much as mind. This event initiates the nerve changes which culminate in the movement of the arm. Hence, there is no question of how a substantival pure mind acts as a physical force. You have an event as truly physical as mental giving rise to a neural or physiological sequence.[23]

Pratt writes: "we have the unhesitating and universal testimony of every unspoiled individual consciousness, and the equally unquestionable evidence of everyday experience that mind can and does determine conduct."[24] And the chief argument for interactionism is that this theory alone correctly summarizes this plain fact of experience. But does it? Does the evidence

[23] G. Santayana, *Realm of Matter*, pp. 123-6.
[24] J. B. Pratt, *Matter and Spirit*, p. 156.

show that mind determines conduct interactionistically, or, that conduct is determined in the way in which we have described? H. S. Jennings, a gifted student of empirical evidence, writes: "Since the particular mental state—the opinion or purpose or sensation—cannot be separated from the particular physical state, but is, so far as experimentation goes, one with it, there is no possible experimental ground for asserting that one of these two things brings about the action to the exclusion of the other. . . . It cannot be asserted that the same physical condition without the sensation or opinion or other mental state would produce the same result, for the same physical condition never occurs without the mental state. And it cannot be asserted that the mental state alone is the cause of the action, for the mental state does not occur alone."[25] In other words, there is no empirical ground at all for believing that pure mind itself initially brings about the changes which constitute conduct, as the interactionist holds. Experience testifies only to the initial presence and operation of psycho-physical occurrences, as we say, not at all to causal initiation by pure mind.

This comparison with interactionism brings out our view of psycho-physical cause and causation, and shows that this view is tenable empirically, whilst the interactionistic view, which is supposed to be empirically ten-

[25] *Universe and Life*, pp. 44-5.

able, really is not. But we must bring purpose and conscious selectivity more clearly into the psychophysical picture. I propose to do this by a comparison of our views with parallelism on the point on which this theory is supposed to be strongest, namely, its methodological possibilities. This discussion will be important as an indication of the reconciliation of teleology and causation, purpose and physical formulae, in human existence, which our theory of mind-body implies.

First, the demands of ethics, history, and humanistic psychology. These enquiries assume the efficacy of human motive, that purpose and fore-plan count in human character and conduct. On our theory, this can be fully allowed. Purpose, however, is not effective by acting physically on energy or brain. Nor is it effective as a cause of purely mental sequent states, as parallelism asserts. Purpose is effective as intention, as vision of direction for the onflow of the energies of the central system. Purpose is neither a physical, nor a mental cause. But under the plan of direction supplied by purpose, central events may give rise to a display of the energies of the person, moulding the person to a new state of character, and determining his conduct.

I decide, for example, to assist a person who is in need. My purpose is the fore-plan in me of an action. I carry the action out. On our theory, the causal initia-

tion of the processes of realization is the work of the central events, not of the entertained purpose. But as these events flow into neuro-motor processes, or, bodily acts, the purpose is there as the employed plan of guidance, and in this sense, namely, as the continuant guidance employed by the central processes, as their self-guidance, the purpose counts. Physically, the purpose neither instigates, nor regulates the neuro-motor prolongations which are its bodily realization. The central processes do. But the purpose is the continuant vision whereby the central processes guide the instigation. That is, the purpose is a central factor in the causal determiner of the consequent bodily acts. Thus, it counts as a guidant factor in the determination of the ensuing conduct. Moreover, as a continuant possession, a centrally employed factor in the current continuant nature, the purpose, under selectivity, is also a control factor in the determination of the telic quality or consequent character of the continuant future. In other words, the purpose counts in character, as well as in conduct. Our theory, then, can satisfy the demands of ethics, history, and humanistic psychology. A person passes to a state of character in conformity with the continuant vision which the central events accept and employ for guidance, since this vision is a regnant factor in the current continuant nature, and therefore a control, under selectivity, of the character of the

continuant's future. At the same time, a person's bodily acts, or conduct, wherever consciously purposive, as it is in endless cases, is causally derived from events in which a central factor is the plan of guidance supplied by the continuant purpose.[26]

As to the demands of physics and physiology, the important one here is the possibility of a thoroughgoing physico-mathematical treatment in the form of a scientifically causal descriptive scheme. Parallelism meets this demand well enough. Interactionism does not. The defect of interactionism is that it implies a situation full of physiological holes. Physiological events run up to the brain, then produce consequences incalculable by physical or physiological methods. And physiological events start up in the brain or person without physical or physiological antecedents from which they could have been calculated. Hence, from the physical laws of the system and the quantitative values of certain states, there is no possibility by merely physical methods of determining at all, even with probability, a quantitative value for certain sequent states, or else, for certain antecedent states. A thoroughgoing physico-mathematical treatment in the form of a scientifically causal descriptive scheme is out of the question, supposing interactionism true. On our theory, this is not so. Where physiological events, such as neuro-motor

[26] Chapter VIII, section 3, supplies further illustration of these points.

prolongations, are not held to be due to merely physical or physiological antecedents, they are held to be due to central or psycho-physical antecedents, which are physiological, although not merely so. And where physiological events, such as the end-event in a bodily sequence culminating in a sensation, or a reflection, are not held to have merely physical or physiological consequents, they are held to have central or psycho-cerebral consequents, which are physiological, if not merely so. Thus, there are no breaks in the chain of physiological causation. The conditions for a thoroughgoing quantitatively deterministic treatment, such as the physical sciences desire, are completely provided.

Efficacy of purpose and mechanistic determinism of the physico-mathematical type, then, are equally permitted by our psycho-physical theory. The interactionist will find this contradictory. "No one who holds to the universality of mechanical law," Pratt writes, "can consistently maintain the efficiency of consciousness." [27] Certainly not, if mechanical law be conceived as a pattern imposed from without and pre-determining in all detail the behaviour of the person, and if efficiency of consciousness be conceived as physical efficiency, physical disruption of an imposed pattern. Then, efficiency of consciousness implies cancellation of mechanistic determinism at least at some point. Our psycho-physical

[27] *Matter and Spirit,* p. 87.

theory, however, does not conceive mechanism and teleology in psychology, or generally, in this way. And in the way in which it does conceive them, the two are, I think, entirely consistent.

Physical efficiency has been denied mind and consciousness by our theory. Mind supplies the vision by which the individual person himself guides his actions. But it supplies no physical force. Mechanical law, as provided for by our theory, is a name for so-called scientific causal laws. But such laws are not patterns arbitrarily imposed on being *ab extra.*[28] They are hypothetical and descriptive, not categorical and compulsive. Nor do they determine in all detail that which they hypothetically describe. They are general quantitative laws. They describe merely a universal logico-mathematical pattern of existence, and are indeterminate otherwise. Thus, it happens that these laws are completely and equally obeyed by a cataclysm and by a windfall. Likewise, all the correct physical laws of energy and other physical laws, are completely and equally obeyed by me, whether I assist the person who is in need, or, merely ignore him. Either act satisfies completely the correct general physical formulae. Both are allowed. Hence, plainly, within the reign of universal mechanism as here conceived, there is place for

[28] A. N. Whitehead, *Adventures of Ideas,* p. 52. H. S. Jennings, *Universe and Life,* pp. 49-50.

the individual determination above described. Mechanistic determinism simply lays out a general quantitative outline. But the filler must be supplied. The individual energy systems in action must determine in particular qualitative details what is only defined hypothetically in general quantitative detail. Here, purpose, idea, fore-plan, vision, have place. Within the general outline of mechanical law, the vision of the energies in action may supply differential qualitative clues for execution, selective forecasts of the future. The energies will fill out the general quantitative outline *in all cases.* But as the energy actions execute their guidance, what is moulded will not only fit into a general quantitative pattern, but it will be moulded in the light of the selective continuant vision which was entertained. Purpose will play a central and a differential role, although not the whole role, in the determination of the ensuing display.

Human action and energy, then, illustrate in peculiar fashion the harmony of mechanism and teleology. Self-determinacy amid causation here takes the particular form of self-governance under conscious purpose amid conformity to scientific causal determinism, or, physical formulae. Viewed externally, as the physical scientist chooses to view it, human action is a sequence of personal and intra-personal events at least physical at every point. The conditions for a scientific causal descrip-

tion obtain, and human action is describable in the usual statistical and other mathematical ways applicable to all physical existence. Viewed internally, as the agent in introspection or as the historian, moralist, and humanistic psychologist who employ sympathetic imagination, might view it, human action exhibits purpose, idea, and vision at crucial points. These constitute particular plans of guidance under execution above the general groundwork of mechanical law, and provide a basis for a selective motivational description of human conduct. Separated, the mechanistic and teleologic views of human action, are half-truth. One gives only an external quantitative description, the other only an internal qualitative description. There are the personal systems harboring effective purposes, as ethics, history, and humanistic psychology maintain. But throughout there are always the animal operations physico-mathematically describable. Santayana writes:[29] "Final causes (purposes) certainly exist in the conduct of human beings, yet they are always inadequate to describe the events in which they are manifested, since such events always presuppose a natural occasion and a mechanical impulse; and these cannot flow from the purpose or choice which they make possible and pertinent. The whole operation of final causes therefore requires, beneath and within it, a deeper flow

[29] *Realm of Matter*, p. 127; parenthesis mine.

of natural forces." The fact of self-guidance and conscious selectivity does not make such forces less natural, but it does mean that they exist within a more than merely mechanical whole.

CHAPTER VII

Pluralistic Monism

1. *One and Many.*

Up to this point, the emphasis has been upon analysis, upon making more distinct the meaning of the diverse items of the real. But analysis presupposes a whole, or, a diversity sufficiently organized that it can be apprehended and described by fixed distinctions. As here understood, synopsis is the comprehensive vision of such an organized diversity or whole, once it has been apprehended analytically. I pass now to synopsis. There are two major problems. The first is to see exactly how the myriad items of the real settle down together into the whole of which they are the items. How are the many one? This is the problem of the present chapter. The second problem is to depict, not the organization of the items, but the whole as a whole of items. How view the whole as a whole, and what is its distinctive nature? This is the problem of the next chapter.

The myriad items of the real are events, continuants, and relations. How do these many form the one?

Two possibilities are at once out of the question. The first denies ultimate reality to relations, conceiving the universe as a radical plurality of self-centered reals. This is atomism. The second denies ultimate reality to relata, conceiving the universe as a whole in which everything is related in every way to everything else. All independence and separation are cancelled, nothing but pure unity is left. This is organicism. Plainly, both theories are incompatible with our view which admits relations and non-relations. Equally plainly, I think, each theory is also incompatible with itself. For example, in denying genuine reality to relations, atomism makes impossible that its unit reals or atoms stand in cognitive relation to each other, hence, that any one of them, such as the atomist, be in a position to know that there are the other atoms of the theory. Similarly, in absorbing all relata into relations, organicism makes impossible that there be any really distinct entity, such as the organicist, who can entertain the distinctive doctrine of organicism, and stand against the atomist as a distinctive sponsor of a distinctive theory. In other words, each theory tacitly negates conditions really required, if the distinctive knowledge which it claims, is to be capable of achievement. Each contains within itself the seeds of its own extermination.

Our solution of the problem of the one and the

many clearly must lie in another direction. I think we shall see this direction once we have recalled, as we should in synopsis, some positions previously taken.

First, as against atomism, we have recognized relationality and internality. On our view, all items of the real stand in some relation to other items. Also, the relations in which items stand are internal to the items, structures intrinsic to the items related. Internality means that items, insofar as they are relational, are really connected transeuntly, or, are non-atomic. Relationality means that all items as real are to some extent relational. We went even further against atomism. We held not only that every item to some extent is internally related to some other items, but also that every item to some extent is internally related to all other items. For example, in our third chapter, we said that every item of the real is related by logical identity to all other items in respect of membership in the world of items. This means that the items of the universe are not only non-atomic, but that they stand to each other in a skeletal organicistic structure whilst standing in a manifold of less extensive relations.

Second, against organicism. Admitting a skeletal organicistic structure, we denied organicism proper, namely, that every item of the real is related to every other item in all respects, that there is no real separation at all in the universe. Consider the passages

which dealt with causality. In these passages, we said that only events are related to the other real items as cause, and that an event is not related by complete identity to the other event, or, to the qualitative relational state of continuants to which it is related as cause. This point alone means that relative to any other item of the real to which it is related, a given item, whether event, continuant, relation, quality, or whatever, possesses an aspect of independence and dis-relation. It is not related to the other item as cause, or, if it is, it is not related to the item to which it is so related, by complete identity. We may say at once, therefore, that no item of the real is related to every other item in all respects. There is real separation. The items of the universe show an unresolved differentiation and atomicity within their skeletal organicistic structure.

These two points are summed up by the statement that every item of the real is related to all other items in certain definite ways, but no item of the real is related to any other item in all definite ways.[1] This doctrine provides connection from every point throughout the whole area of the real, a unity pervading the cosmos, a genuine one. At the same time, it insists upon an ever present disunity, an unresolved plurality, a genuine many in the one. This doctrine is called

[1] M. R. Cohen, *Reason and Nature*, p. 150.

pluralistic monism. Besides our theory of internality, its main supports are our theories of logical and ontological relations.

Logical relations provide a universal connective structure joining all items. It is commonly said that viewed purely logically entities tend to lose their individuality. In the realm of pure logic, individuality is absorbed into pure universality. This is the root of truth in organicism. Besides the realm of pure logic, however, there is the realm of concrete existence, in which the logical realm, howsoever far it may spiral upward, is implanted and ultimately moored.[2] And when this concrete realm is brought into the picture and reality fully viewed, individuality, separation, differentiation, are seen to be present even in items which appeared most purely non-individual from the abstract logical point of view. Existence involves world-wide separation and division. And the relations peculiar to existence, the ontological relations, in uniting prime items, provide a world-wide differentiation between items, a division and disrelation between any given item and all the other items of the universe.

I have already illustrated this by a reference to causality. The other ontological relations equally illustrate it. Consider substantival inter-ingredience. Only con-

[2] Logical relations apply to events and continuants. Hence, the system of logical relations is always moored in the realm of matters of fact, or, the ensemble of events and continuants.

tinuants and events, the twin substantives, are substantivally inter-ingredient, and a continuant or event stream is not related to an event stream or continuant with which it is substantivally inter-ingredient, by temporal priority, temporal posteriority, complete identity, and manifold other relations. This means that relative to any item with which it is related and it is related to all items, any given item, whether continuant, logical relation, or anything in between, possesses an aspect of independence and disrelation. It is not related to the other item by substantival inter-ingredience, or, if it is, it is not related to the item to which it is so related, by temporal priority, temporal posteriority, and multiple other relations. Thus, between any item and all other items, substantival inter-ingredience involves separation and dis-relation, even as causality did.

Pluralistic monism, then, depicts reality as a whole of items each of which possesses relative individuality within an all embracing connectivity. There is transcendence; no item is purely atomic. There is individuation; no item at all, even the most purely logical relation, is completely fused with all others in all ways, or, is purely transcendent. Ontological form is the principle of world-wide individuation. The ontological relations provide a genuine ubiquitous disrelation

within the comprehensive world-wide inter-relation provided by the logical relations.

Atomism and organicism, I have said, fail to secure the conditions required to make possible even the knowledge which they claim to offer. Pluralistic monism, I think, secures such conditions for itself. It allows world-wide connectivity. This provides a whole which is in principle completely explorable, which possesses a thread of connection that can be followed from end to end, a knowable whole. At the same time, it insists on ubiquitous atomicity. This permits a being who is knowable to have the distinctive place of knower in the knowable whole, and it also permits an endless wealth of differentiated detail there to be known, which can further testify to the pluralism within the monism. Thus, the universe depicted by pluralistic monism is exactly the sort of universe which a knower could find, and would find, if pluralistic monism were true.

I submit also that this universe is exactly the sort of the universe which the knower does find in cognition, indeed that pluralistic monism gives the epistemological problem, wherever it genuinely occurs, a meaning and a basis. Certainly, the epistemological problem is not how a mind shut up in this corner can know a purely transcendent object shut up in another corner, a Cartesian nature, a Lockean X, a Kantian thing-

in-itself. This is a hopeless problem, and, what is worse, an entirely artificial problem. No cognitive enquiry, including first philosophy, is really a flight to the purely transcendent. The problem of knowledge, as it occurs in actual enquiry, I think, is not how a knower can know an unknowable, but how a knower who already possesses some knowledge can advance securely into the unknown. How can knowledge be really increased? This is the great concern of all serious enquiry, I believe. Now, pluralistic monism gives this problem a base and a meaning. It provides a highly differentiated plurality making possible an unknown, and a principle of connectivity which secures knowability to the unknown. This answers the theoretical question of how knowledge can be securely increased. Certainly, the subjectivism of radical atomism (Humism), and the pure transcendence of radical organicism (Leibnizism), cannot offer an answer. On the first, any knowledge transcendent of what is momentarily given in the knower, is out of the question. There can be no increase of real knowledge of the beyond, or, indeed, any such knowledge in the least. On the second, transcendent knowledge is all already immanent or pre-established. The knower is already all connected up with everything in every way. Thus, no real increase of knowledge of the beyond is possible here either. Nor does the critical dispensation

(Kant) do much better. The critical philosophy does harbor both subjectivism and transcendence. But ultimately it retains them side by side without integration, subjective nature and transcendent thing-in-itself. The critical philosophy divides the world into a realm which is already mentally formed and enveloped *a priori,* and an unknowable which never will be. The world is not simply divided into a known and a genuinely unknown which can be and is to be known, as the world is for all serious cognitive enquiry.

In this epistemological discussion, I have not mentioned the internality principle. Yet this principle has several epistemological implications of considerable importance. I will state two. First, internality implies that those sciences which endeavour to grasp entities through their relations, including their logico-mathematical relations, are not retreating from reality, viewing the entities artificially, as some say. They are advancing into the intrinsic nature of the entities.[3] Such sciences always remain abstract. They fail to capture a wealth of qualitative individuality in the entities. But, in tracing relations in which the entities stand, these sciences are penetrating into the internal nature of the entities, not dealing with them conventionally and artificially, if internality is correct. Second, internality means also that the so-called organic or cultural con-

[3] M. R. Cohen, *Reason and Nature,* pp. 156-158.

ception of history, now widely recognized in practice, is more tenable than its rival. For example, in the human scene, not only the political and military relations, which the rival of the cultural conception of history celebrates, but also the economic and technological, the artistic and religious, the physical and intellectual relations in which individual men and movements stand, according to internality, enter into the real nature of these individuals. Accordingly, all of these relations should be noticed, as the cultural or organic view of history contends, in an accurate description of the nature of these individual men and movements, such as human history professes to attempt. I mention these implications of internality to indicate vital epistemological bearings of a key principle of world structure, as above I indicated vital epistemological bearings of the world view based on our fuller set of cosmic structural principles. The careful elaboration of these epistemological implications belongs to the philosophy of history, the philosophy of science, and epistemology itself.

Our doctrine, then, envisages a universe of items with individuality and universality, a genuine one and a genuine many in the one. Neither the chaos of atomism, nor the night in which all cows are black of organicism, is acceptable. I call the doctrine sup-

planting atomism and organicism, pluralistic monism. This doctrine was foreshadowed in the earliest chapters where we allowed a basic place both to individuality and to a relationality pervading the individuality, *e.g.* the substantival inter-ingredience internal to the individual continuants and events (Chapters I, II). In its full scope, however, pluralistic monism is a direct implication of our theory of logical and ontological relations, and the internality principle. These doctrines imply a world pervaded from every point by intrinsic connectivity and equally pervaded at every point by disrelation within the universal connectivity, a pluralism in a monism. As we have seen, such a world allows such a theory as pluralistic monism to be tenable. There is no contradiction, as is the case with atomism and organicism. Also, this world is exactly the sort of world demanded by every genuine cognitive enquiry. In consequence, we may say that the doctrine of pluralistic monism is not only a self-consistent synoptic implication of previously established theory, but also that it fits the world facts of the empirical situation as these are faced in every genuine cognitive enquiry.

2. *World-Picture.*

I subjoin a brief world-picture, based on the manifold results of the preceding analytical chapters, in order

to bring into sharper focus the universe here envisaged under pluralistic monism.

At first glance, this universe is a plurality of finite continuant individuals. The individuals are material configurations with definiteness displayed by intrinsic quality. The configurations occupy routes, and are ingredient in processes over the occupied routes. The universe is a plurality of finite continuant configurations ingredient in sets of route events. Each new event, and each new material section of each continuant, derives existence from antecedent events. New existence springs *a tergo,* transeuntly or immanently. The principle of existential derivation is causation, which is the principle of all consequent finite existence, and harbored in events.

Amid causation, constant inheritance of material occurs in the routes. This inheritance is grounded on selectivity. Continuants select. Each continuant has a determinate material nature with which the causal events must work. The nature of continuants therefore conditions what the causal events will bring forth in the continuants, what the continuant future will show. This determination extends to the inherited material as well as to the quality which will display the pervading definiteness of the total material of the immediate future. Continuants are wholly self-selective amid the causation of the future. Events involve continuants,

as continuants involve events. And events bring on novelty. Accordingly, continuants show the existence not only of selected inheritance, but also of selected novelty amid the derived inheritance. This is continuant emergence, which shows events not only as efficient of derived states, but also as efficient of emergent states, and therefore as evolutionary in full pattern.

Inheritance and emergence occur throughout the event-continuant ensemble as pervaded by the mechanistic-telic structure of causation and selectivity. Also, this ensemble is pervaded by spatio-temporal structure, which has a character relative to its occupants. It is not an entity absolute and independent of the finite event-continuants. The spatio-temporal structure defines the extensivity of the ensemble as a system of concrete prime matters of fact, an ontological system. Finally, the concrete ensemble is permeated in all details by logical structure. For example, every item, not only each event and continuant, but each relation and quality, each part and possession, is identical with itself, identical with all items of its type in respect of type, and identical with all items of all types in respect of inclusion in the whole of items. Logical relations provide a connectivity which radiates from every item of a type to all other items of the type, and from every item of a type to all other items of all types,

a connectivity which embraces all items in unity. Within the logical connectivity, of course, dwells the differential ontological connectivity. And this ontological structure effectively secures a concomitant disunity throughout the whole universe. In joining up concrete items in certain respects, it sets off these items from each other in certain other respects, and it sets off the logical items from each other and from the concrete in all concrete respects. It permits an individuality to exist full-bodied in the concrete, and defines an individuality which is full-bodied and really present in the logical. As seen to be differentiated each from all the remainder of items, the logical items of course are viewed not purely logically, but cosmologically, namely, in their setting in the whole of items.

The world as here envisaged is not the familiar static universe iron-clad in all minutiae. The general principles are fixed. But the general principles demand only that the detail depend on other detail in certain definite ways. This integration of the detail, genuine and pervasive, allows systematic play to multiplicity and growth within the universal systematization. Consider spiritual growth as a cardinal example, truth, goodness, beauty, for instance. In this chapter, I have indicated how the principles of cosmic organization here submitted provide exactly the sort of world-order de-

manded for the growth of knowledge. In the discussion of the psycho-physical problem in the preceding chapter, I have indicated how a universe harboring flux and permanence, mechanism and teleology, as here conceived, permits continuant self-determinacy of consequent moral quality by antecedent purpose and ideal. As to aesthetic quality, John Dewey writes: "There are two sorts of possible worlds in which esthetic experience would not occur. In a world of mere flux, . . . (and) a world that is finished, ended. . . . Because the actual world, that in which we live, is a combination of movement and culmination, of breaks and re-unions, the experience of the living creature is capable of esthetic quality."[4] Thus, truth, goodness, and beauty, are the very details which a world, based on such general principles as here laid down, permits to the experience of such living creatures as human beings. In this sense, our event-continuant universe is no static iron-clad system, but open and permissive within the systematic cosmic unity which pervades it.

The real, then, is a system of mutually dependent and independent factors, existing as a totally organized fact. The system is unified and diversified, one and many, pervaded by relationality and ubiquitously individuated within the relationality. The name of this doctrine, as I have said, is pluralistic monism. And

[4] *Art As Experience,* pp. 16-17; parenthesis mine.

the thumb-nail sketch of the universe above submitted is a summary of the particular answer implied in our antecedent analyses to the synoptic problem of which pluralistic monism is the general answer. It describes the system of the factors, the many as they settle down together in the one, according to the results of the preceding chapters.

At the outset of this chapter, I said that there is a second synoptic problem. The real is a system of factors, existing as a comprehensive and totally organized fact. The concern of this chapter has been with the systematization of the factors, how the many go together. This leaves the comprehensive and totally organized fact. How describe this fact as a whole and total fact? What is the one as one? This problem, which remains for discussion and which is discussed in the next chapter, poses the final question of philosophical enquiry, since beyond the one as one, or, the whole as a whole, there is no beyond.

CHAPTER VIII

God and Man

1. *God.*

The real, then, is a system of factors existing as a comprehensive and totally organized fact. It is the sum total of being as an ordered whole. How describe this being, not in its factors, but in its comprehensive being? This is our general question.

The specific aim of this chapter is really three-fold, first, to describe the real[1] or the sum total of being in its comprehensive being, second, to emphasize certain general implications of this description, and third, to point out the place of man in the comprehensive whole. Accordingly, this chapter has three sections. The first of these, the present section, gives the outline synoptic description of the Real in its comprehensive being. I will set down this description in a series of propositions, whose meanings I will explain, and whose contentions I will defend. The first proposition is preliminary to the description proper, but it will enable us to make the bearing of the main description clearer.

[1] For convenience, hereafter I will write real with a capital R where I mean the sum total of the real.

First, the Real has being. By the Real is meant all that is anything, the sum total of being. By having being is meant that the Real is something. That all that is anything is something, seems to me a proposition too obvious to require proof. What sort of something? What are the components of this something, and its properties? These are questions, on the other hand, whose answers, I think, are by no means obvious, and are in need of considerable proof. Our event-continuant philosophy is our answer to the question of the components of the Real, and states the reasons for our views. The propositions about the Real to follow, will state our answer to the question of properties, and give the reasons for these views.

Second, the Real is infinite. Infinite has manifold meanings. Probably two are most important here. First, infinite means indefinite. This property is ascribed to the Real, I believe, when attempts are made to picture it. Every attempt to image or picture all that is, results in an image having boundaries which shade off indefinitely. The All always extends indefinitely beyond and is never wholly captured in the image. This fact has led great philosophers, such as Spinoza, to declare, not that the Real is indefinite, but that the imagination is incompetent. And this opinion of imagination is enforced by other considerations, for example, that certain objects in mathematics,

such as points and chiliagons, are known, understood, definite, yet cannot be pictured clearly and accurately by the imagination. Our own opinion agrees that imagination is incompetent here. On our view, the Real is definite, it is a systematic whole with definite and clear-cut first principles. To call the Real indefinite, or, infinite in this first sense, therefore, is not to give a genuine description of its real nature, but to indicate that one has not yet actually grasped its real nature. The imagination which grasps the Real as indefinite is incompetent to apprehend it as it really it. Besides indefinite, infinite means including everything, lacking nothing, whatever cannot be said to have anything outside it which might limit it, give it bounds, make it finite. The infinite is the complete. This infinite cannot be pictured. One can only picture the incomplete. But this infinite has a definite clear-cut meaning, and can be defined. Indeed, I have just defined it. And the Real as here understood is infinite in this sense. As all that is anything, it includes everything, and lacks absolutely nothing. Hence, there cannot be said to be anything real outside it limiting it, giving it bounds, making it finite. The Real is the complete.

Third, the Real has individuality. The Real has a pervading form or structure. This was indicated in the preceding chapter which described the structure of

the Real. The Real also has qualitative individuality. It has differential qualities displaying a peculiar nature. Infinity is an illustration of such a quality. No other reality besides the Real is infinite in the sense of complete. If two realities, the Real and another real, both were infinite in this sense, they would have to be wholly the same, not different. If they were at all different, as A and B, A would contain a reality not in B, or lack a reality contained in B, or both. Difference implies at least that. Hence, if A were complete and therefore did not lack a reality contained in B, A as different would contain a reality not contained in B, or, B would be incomplete. Since the Real like A is complete, as we have just seen, no other real such as B can therefore be said to be different from the Real and also complete. Infinity as completeness characterizes only the Real, distinguishing it.[2]

Fourth, the Real is eternal. Eternal may mean unchanging. That the Real, or, infinite whole, does not possess the property of changing, has already been

[2] As all-inclusive, the Real contains every quality of every real. Some might argue from this that every real is, therefore, qualitatively indistinguishable from the Real and, in consequence, from every other real. This conclusion is incorrect. As all-inclusive, the Real contains every quality of every real, but it contains every quality as a quality of the real of which it is a quality, not as a quality of itself. Hence, each real as included in the Real remains qualitatively distinguishable from the Real and from each other real from which it was qualitatively distinguished otherwise. See my article, *The Subject of All Judgments, Mind,* Jan. 1933, p. 17 *ff*.

shown in our second chapter. Eternal may also mean timeless, dateless, neither past, nor present, nor future. The Real is also eternal in this sense. To hold that the Real has date, that it can be said to be past, or present, or future, is to make the infinite finite. It is to put something real outside the Real, to wit, the items in relation to which alone one could possibly say that the Real, or the sum total, is past, or present, or future. Such items would have to be real for this assignment of date to be possible. And as real they would mean that the Real did not contain the sum total of the real, which is a contradiction. Time is certainly real. At least, we hold that it is. But time as real is within the Real, relating finite items. And the finite items are temporal, not the Infinite, or Real. There is no reality before or after the Real, in relation to which alone it could be said that the Real is either past, or present, or future.

Fifth, the Real can be intelligible only through itself, through its own internal nature and being. This follows at once from the fact that there is no reality not contained in the Real, hence, no reality by means of which the Real could be intelligible, except the being internal to it. This proposition has considerable importance. It determines the procedure proper to first philosophy, which seeks to grasp the Real intelligibly. Positively, the proposition means that the Real must

be philosophically described solely in terms of its own nature and internal principles. Negatively, the proposition means that the Real cannot be intelligibly described, either by depicting a Cause from which the Real arose, or, by depicting a Purpose toward which the Real is working. As the sum total, the Real cannot be said to have anything prior to it which might have efficiently caused it, nor anything beyond it toward which it might conceivably be proceeding. This restriction on efficient and final cause, mechanism and teleology, as philosophical principles, will be discussed below, where implications of the present description of the Real are considered.

Sixth, the Real is perfect. Perfect may mean morally perfect, or, acting in conscious conformity to the purposes or ends which are held to constitute the moral ideal. Such perfection cannot be ascribed to the Real. As I have just said, the Real cannot be described intelligibly as acting for an end or purpose. And since such description is requisite to assign moral perfection to a being, this perfection cannot strictly be assigned to the Real. Moral perfection is assignable, if at all, to beings such as men, who are purposive, and choose to conform to moral ideals. Perfection, however, has another meaning. It means that which has everything, and requires nothing, that which is all in all, or, complete. In this sense, the Real is perfect, and

alone fully perfect, since it is the one sum total of reality, hence, alone wholly complete.

Finally, the Real is free. By free is meant free of external determination. And the Real plainly is this. The Real is all that is anything. Hence, there cannot be anything outside it which might possibly determine it. Its determinations must be grounded wholly on its own internal being. Hence, the Real is free.

This entire description of the Real is summed up by saying that the Real is an infinite individual, eternal and self-intelligible, perfect and free. The Real is the supreme and complete individual. Such an individual is usually called God, and this is the name I have given to the Real. The Real, however, is considerably different from the God of popular legend. In legend, God is conceived anthropomorphically, as an indefinitely enlarged human person, causally efficient, consciously planning, morally perfect, operating very much like a human being. This God of legend has a significance which is not wholly specious. It dramatizes the supreme being, so that God has a clear relevance to human concerns. And as we shall see, God is relevant to man, and to man's existence. Taken as literal description, not as dramatic or metaphorical depiction of being in its supreme form, however, the popular version of God is considerably defective. It conceives the infinite being as really finite and incom-

plete, a king within a kingdom, a person among persons, a potentate raining manna on obedient subjects and hell-fire on recalcitrant subjects, a being who loves and wins and loses, and looks to the future to make amends for what has happened in the past. God is a limited existent pleased and frustrated in turn by various other limited existents, a creature of time and circumstance. Taken literally, as good folk often take it, such a portrait of God is a warped image of being in its supreme form, an image colored up by human hope and fear, an idea projected by imagination inflamed by passion, a confused idea in Spinoza's sense. Seen clearly, in light of rational proof and evidence, being in its supreme and complete form is not in time and circumstance, but eternal and changeless, necessarily lacking the purposive emotions which rile and rule man. Not a warring Zeus, nor a sword-drawn Jehovah, this being takes up whatever of positive being, if any, is possessed by these gods, and embraces all other being with these in an infinite complete perfection. In contrast to the deities of emotion and passion, such a being has no bounds and contains all who have, because he is wholly complete. Plainly, only such a being is a literal portrait of being in its supreme and complete form. And such a being is the Real, as we have depicted it in the preceding description.

2. *Implications.*

Some implications of this description of the Real require statement to connect the doctrine of this chapter more explicitly with other parts of this book. This connection can be made additionally explicit by consideration of a dialectical difficulty. I will begin with the dialectical difficulty, then pass to the implications.

The doctrine of this chapter compared with doctrines of previous chapters, may appear contradictory. This chapter seems to affirm a 'static' universe, one finished and complete, going nowhere. But previous chapters presented a dynamic universe, one full of movement and purpose, action and reaction. How can we say that the two are one? Or, to put the difficulty differently. In this chapter, we have contended that change and time, causality and teleology, are not ascribable to the Real. In previous chapters, however, we spoke of change and time, causality and teleology, as first principles of the Real, or, at least, as ultimate reals. Are we not entrapped here in a complete contradiction?

The contradiction, I think, is really apparent only, disappearing with accurate perception of our position. This position is as follows: Change and time, causality and teleology, are not ascribable to the whole as a whole. As all-inclusive, the whole cannot be said

to be passing to something else or changing, or, to be a change, possessing a before and an after, causally derived, purposively governed. As all-inclusive, it is necessarily the opposite. Still, change and time, causality and teleology, can be said to be real and are real as parts or as structural features of parts within the all-inclusive reality. Parts within all that is real are changes in time, causally derived, purposively governed.

Now, this position is contradictory, I think, only if the following argument is true. The whole as all-inclusive is not a change, or, passing from an antecedent source to a consequent goal. Therefore, parts in the whole as parts cannot be changes, or, passing from antecedent sources to consequent goals. But such an argument is an elementary embodiment of the whole-part fallacy. The whole is not an A or xy, therefore, parts of the whole cannot be A*s* with xy-*s*. A house is not a stone, or small and light, therefore, parts of the house cannot be stones which are small and light. Clearly, the whole of all the changes that are ever real, would have temporal, causal, telic changes as parts. But, just because it was this whole and inclusive of all changes, there would be no change before it from which it could be said to be causally derived, and no state after it to which it could be said to be passing, or purposively related. It could not be a

change, or temporally changing, although its parts would be temporal causal changes.

Some philosophers have destroyed the finite to make room for the infinite. Others have destroyed the infinite. On our position, both are real. Each, however, is real, not in all ways, but in certain determinate ways, befitting its nature. The infinite is real as all the changes and things that are ever real. The finite is real as the changes and things which constitute with their possessions and relations all the parts within the Real. In the parts, the universe is dynamic, full of movement and purpose, action and reaction. As a whole, the universe is a-dynamic, a systematic totality lacking nothing real, and therefore, not moving from anything to anything, not derivative, not seeking. On this position, change and totality, finite and infinite, man and God, have place together without conflict or contradiction. Indeed, each completes the other as part and whole in the being of what is fully real.

Instead of contradictory, then, the doctrines of this chapter and of the previous chapters really complement and complete each other. I pass now to the implications of our doctrine of the Real which I promised to state. These implications are three: epistemological, methodological and cosmological.

The epistemological implication is that any theory of knowledge which pretends to do justice to the full

range of the knowing mind, must recognize a power of cognition additional to sensation and imagination. The Real has a known existence and a distinctive nature which mind can grasp and describe, as we have. Yet the Real, cannot be imaged, as we saw. Nor can it be sensed, since sensation can take in only the here-now, which is always only some circumscribed portion of the whole of the real. To explain the knowability of the Real, and the knowledge of the Real which we have, some effective cognitive power additional to sensation and imagination must therefore be granted.

This point is enforced by other considerations. Besides God, many items of fact have determinate being and natures which can be known and are known, yet which cannot be caught in an image, or apprehended by a sensation. Some instances are mathematical points, abstractive sets, the series of real numbers, respect for law, the whole of space, personality, universals.[3] Some have argued that even ordinary tangible things, such as the particulars of so-called external nature, are not really known until a cognitive power supplementary to sensation and imagination has come into play.[4] But we shall content ourselves here with

[3] M. R. Cohen, *Reason and Nature*, p. 72 *ff*. Ribot, *Evolution of General Ideas*, p. 114 *ff*.

[4] Kant, *Critique of Pure Reason*, *e.g.*, the so-called subjective deduction of the categories. Kant called this supplementary cognitive operation intellectual synthesis, understanding, judgment. *Cf.* Descartes, *Meditation Two*, on knowledge of so-called external things.

the assertion that there are some reals, mathematical points as well as God are instances, which are known, yet whose being and nature as it is known cannot be accurately pictured by an image, or, apprehended by a sensation. The knowledge of these reals demands recognition of a cognitive power additional to sensation and picture-imagination.

These reals are not to be thought of as detached from sensation, things by themselves. God, for example, is not such a thing. As containing all reals, God contains sensible reals. Sensibility provides a first ingression into God's being. Similarly, mathematical points are not things by themselves. For example, as interpreted by the Method of Extensive Abstraction, mathematical points are logical systems of enclosure volumes many of which are ordinary sensible matters of fact, as we have seen. These systems are not detached, and sensation helps in the disclosure of their reality. Our point is that sensation and reproductive picture-imagination, which copies sensation, at the very best never wholly disclose the reality of these entities, and never can, and that some cognitive power supplementary to these two must be acknowledged, therefore, to account for the comprehensive knowledge of these realities which we do have, and can have. This cognitive power itself, also, is not to be thought of as detached from sensation. It is not a separate faculty, which wings

its way alone, by virtue of some supposed inner principle, such as non-contradiction, to a pure transcendent reality which never appears at all in sense-experience. The cognitive power for which we argue does not dispense with sense and imagination. It simply completes the data of sense and imagination by introducing a vista in which whatever is truly disclosed by these other powers has place. It apprehends a reality, such as God, which is in some relation to sensibility, although never more than partially given in sensibility. And it amplifies our direct sensory and imagic apprehensions by a more comprehensive insight, so that we no longer see this reality darkly, as we always do in sense and picture-thinking, but see it whole and, therefore, face to face.

The methodological implication has a negative and a positive side. I will state the negative side first. According to some, the fundamental philosophical question about the cosmos or universe is Why? Whither? According to the doctrine of the preceding section, Why? and Whither?, applied to the universe or the Real, are meaningless questions. These questions may be applied to finite beings, such as man. But to assume that the whole has a why, a genesis, a cause, is to assume a reality behind the whole from which it has issued. To assume that the whole has a whither, a destiny, a far-off divine purpose, is to assume that the

whole lacks something which it has yet to get. In both cases, the whole is thought of as not-whole, which is a contradiction.

This negative formulation suggests the limitations in philosophy of the genetic and teleological methods. Consider, for example, the current fortune of the genetic method. Of recent philosophers, emergent evolutionists rely most on this method. In the end, however, they abandon it. In his final view, Morgan postulates a God who 'causes' the emergent series, but is not Himself an emergent. In his final view, Alexander denies that any of the emergent stages supposedly higher than mere space-time is really more than space-time, that is, he denies emergence. To depict the whole as whole, each philosopher in his way abandons the genetic or emergent principle. Certainly, we do not advocate abandonment of the emergent principle in the ways in which Morgan and Alexander abandon it. As against Alexander, we hold that emergence is a real principle of events, that is, of parts within the whole, not reducible as he says. As against Morgan, we hold that emergence is grounded on finite events and continuants themselves, not on a non-emergent Person. But we agree that the genetic method cannot say the last word in philosophy. It is applicable to parts in relation to other parts, really applicable there. But it is not applicable to the whole as whole. And first and

last, the purpose of a philosophy is the more comprehensive interest, the study of reality as a whole.

To state this methodological implication positively. According to Aristotle, there are four ways to study a whole, namely, to study its source, its matter, its form, and its goal. Since the whole which first philosophy studies has no before and no after, no source and no goal, only two of these modes of study are open to it, namely, to study the 'matter', or, the elements composing the Real, and to study the form or system of these elements together with the nature of the Real as a formed system. This program has been adopted and followed in this work. We began with analysis, the discussion of the comprehensive elements or principles composing the Real. Analysis corresponds to a study of the 'matter'. We passed to synopsis, the discussion of the form or unity of the elements and the nature of the formed system as a system, or, a whole. Synopsis corresponds to a study of the 'form'. As we proceeded, we indicated a real place for genetic and teleologic methods. They apply, we said, to particulars illustrating prime elements. These particulars have genesis and cause, purpose and goal. Our discussion of cause and purpose, however, was made to clarify further the meaning of these elements, mainly, events and continuant states. That is, it was part of the analysis of these two of our three prime elements, not

an application of a new approach. Thus, analysis and synopsis, study of components and study of the whole as formed and composed, has constituted the whole program of this work. That this is what should be the case in first philosophy, is the methodological implication of our doctrine of the Real here, now stated in more positive terms.

The cosmological implication I desire to mention concerns the relationship between finite and infinite on its negative side. I have said that God has neither purpose, nor cause. Similarly, it might be said, God is neither cause, nor goal. Causality and teleology are attributable to finite, temporal existents. But to think of God as a cause, or, as a goal, is to conceive God as temporally antecedent to something else, or, temporally posterior to something else. God becomes a member with many other members in an order of quasi-externality, not the whole.

Bearings of this implication on God's relation to man, will be mentioned in the next section. But one bearing of this implication on God's relation to finites generally might be worth mentioning in passing. This is that, if we are correct, there is no genuine philosophical problem of how the infinite differentiated itself into finites, or, of the first beginnings from God of the finite particulars. The finites are not emanations, fulgurations, etc. Such a view imputes to God

a causal, even a teleologic, role, which, if the above is true, is absurd. This point, that finites are not emanations, etc., that the whole does not differentiate out the finites, is a complement of positions in previous chapters. In the chapter on causality, for example, we said that derivative finites always attain existence from antecedent finites, arising from specific events under specific circumstances. Wherever there are beginnings finites emanate from other finites, not from God. Finite causation is the only problem of emanation. As to the infinitude of finites as distinct from any particular derived finite, this is God. And God, as already remarked, presents no problem at all of genesis, or, of emanation.

3. *Man.*

In concluding this work, I wish to return to the reflections on man which occurred at the end of the chapter on teleology. We were discussing the psycho-physical problem. In earlier chapters, we had described man as a continuant, a configuration with a history, a finite and spatio-temporal, relative and substantival center of causal influence, exhibiting inheritance and novelty amid selectivity. In the chapter on teleology we described the role of conscious purpose in human life. We said that conscious purpose is a continuant possession which serves in numerous cases as vision of

guidance for the display of the central energies. The central events bring on the bodily actions and continuant states, but employ purpose for guidance. Since purpose is used as a guidant factor by these events, we said that it is a factor in the determination of the existence of the consequent bodily actions. And since purpose is a continuant possession, or, an element in the current continuant nature, we said that it is also a factor under selectivity in the determination of the character of the consequent continuant future. Purpose counts decisively in character, and in bodily action, or conduct.

This position secured moral freedom in the sense of conscious determination of self by selected ideal or purpose. But it did not mean that wherever man is purposive, he is free to get anything, free of all external obstruction. This latter freedom depends on much more than the efficacy we attribute to the guidant purpose. There are the extra-bodily events originating elsewhere and controlling the existence of externals. Above all, there are the other continuants, whose natures may permit what another wants, or, may select what is obstructive. One person may defy another. Two stubborn men with opposite views on a practical political issue, for example, may sit down for conference. Their purpose is to persuade each other. They try, but fail. Neither persuades the other. Neither

gets from the other what he wanted. Yet the purpose of each served as a guide employed by the central actions and therefore as a control factor in the determination of the existence of the conduct. And the complex of characters emerging in each person, and shown in reaction to the other's actions as well as in the actions themselves, were such characters as the stubborn purposive nature of each person in this transaction allowed. Purpose counted decisively. Each person was purposively self-determined, his conduct and manifest character showed this determination. Yet neither got at all from the other what he wanted.

The moral freedom of man is not freedom to get everything. Purposive actions always occur in a community of conscious and non-conscious beings who are all equally self-determinate. And if the character of one's own future is tied to the character of one's own nature, such is also the case with the other communal beings. Accordingly, one finds in them, not necessarily what one wishes to find, but what the nature of each permits. And one gets from them, not necessarily what one wants to get, but what is allowed. In the satisfaction of one's wishes in this extra-self direction, the smile of fortune, determinations not in one's own power, always play a part. This does not mean that effort in this direction is useless. Effort has its effect, of course. The point is that the success of

effort is always conditioned by the selectivity of the other beings. When the person reaches out to, and makes demands upon, the being of others, human and non-human, he is always bound at least by a chorus of permissions, since these other beings, conscious or non-conscious, are just as stubbornly self-selective under transeunt influence as the person himself.

I wish now to bring this account of man as a purposive agent more explicitly into connection with the account of God given in the preceding sections.

First, a negative point. Man's conscious purposive self-determination, sporadic as it may be in our universe, is not nullified in the least by theological considerations. On the contrary, it remains in full force. As we have seen, God is not a cause. The finite is not a puppet of the infinite. This means that the determinateness of entities in finite situations, such as above depicted, needs no essential modification when God is brought into the picture. Man's freedom to follow through his own wishes in his own being, to make them count in thought, in character, and in bodily conduct, is not complicated by fatalism, or, by theological predestination. This is our first point.

Secondly, what I have just said amounts to this, that wherever employed, purpose is genuinely real within the Real. It is not cancelled by a Higher Destiny, nullified *ab extra*. Now, this is also true of value.

By a value I understand that peculiar quality present in an item when the item can meet or is meeting the demands of a purpose or ideal or interest entertained toward the item. The objective item has value. And it has value whenever its nature can allow or is allowing the satisfaction, or, the facilitation of the satisfaction, of a purpose, ideal, or interest directed toward it. Since purposes are genuinely real, and since items really exist in situations of this sort, values are real. In a universe such as ours, where human beings are active and items are valued, values are organic to reality.

On this point, our position agrees with idealism. Our position disagrees, so far as idealism regards value as exhaustive of reality, or, as a first principle. This work repudiates the romantic glorification of man's concerns traditional with idealism. Value is an instance of a widespread objective quality, a sub-form of quality, not a first principle. At the same time, in interpreting value as a quality in items meeting or able to meet interests, our view assigns value an irrefrangible place at least in any universe in which any philosopher has place, since a philosopher must have interests and find items meeting the demands of at least some of these interests, if he is to live well enough to philosophize, or to attain any results from philosophizing.

Thirdly, the vein of aspiration in human purposiveness also fits well within our doctrine of the infinite. In its aspiration, human selectivity is envisagement of objects which will enhance without disordering. Aspiration is the quest for enrichment with integrity. This quest may be satisfied in various ways to various degrees. The point here is that the infinite is the supreme model for such a quest. The desire, we say, is for enrichment with integrity. But God, as the whole, is all fulness within order, complete richness within complete integrity.

This position is not that God is man's purpose in the sense of man's temporal goal, beyond in time. Such a view, as we have seen, is absurd. The position is that God's being enshrines in its perfection the principle at the seat of man's aspiration. Besides the actuality which includes all actualities, God is the actuality seen darkly in all ideality. God is not a temporal goal but the external exemplar of that state of being sought for by all aspiration toward temporal goals. Not to become God, but to become as God—that is man's quest. This position indicates, as do previous points, how a theory of conduct and value, just as other special sciences, can have a root in a first philosophy or world-theory. At the same time, it confirms ancient wisdom. In his wholeness, we say, God enshrines what man in his aspiration most deeply

venerates. Hence, the significance of the statements that the fear of God is the beginning of wisdom, and that the love of God is, as Spinoza has said, wisdom indeed.

Appendix

APPENDIX

Historical Note [1]

Since the Renaissance, philosophy in the West has had two epochs, each occupying less than two hundred years.

The first epoch originated in the late sixteenth century, and found its stride in the seventeenth and early eighteenth centuries. This epoch contained such illustrious thinkers as Galileo and Descartes, Spinoza, Leibniz, and Newton. It had certain noteworthy cultural concomitants. In politics, the system of the era was overwhelmingly monarchial; in economics, overwhelmingly feudal. Both were dominated by the concept of hierarchial permanence and stability. In the arts, one finds the works of Bach and Haydn, Pope and Racine, the endless works celebrating love of classic fixity and hard precision. In the sciences, the remarkable advances were in mathematics and mathematical physics, in such discoveries as the calculus and the Copernican-Newtonian mathematical system of physical principles. The philosophy of the epoch belonged to the prevailing cultural pattern. It was dominated by the metaphysical concept of fixity or permanence, so-called substance, and by the rigid categories of mathematics and mathematical physics, and it reached its apotheosis in Kant's *Critique of Pure Reason,* which handed over the whole domain of the knowable, fixed permanently and for one and all, to mathematics and mathematical physics.

The second epoch of post-Renaissance philosophy originated in the late eighteenth century, indeed in the biological analyses of Kant's *Critique of Judgment,* and it found its stride in the

[1] See my article, *The Metaphysical Situation, Philosophical Review,* 1937.

nineteenth and early twentieth centuries. The epoch contained such illustrious thinkers as Darwin and Hegel, Spencer, Nietzsche, and Mach. It also had noteworthy cultural concomitants. In the political and economic spheres, it was an era, not of complacent stability, but of material change and militant expansion. The American revolution, the rise of loose-jointed democracy in America, and the opening of the great western frontier, were paralleled in Europe by the French revolution, the Napoleonic wars, the rise of French democracy, and the new growth of empire, particularly the German and modern British empires. The Industrial revolution was to the fore. Material progress, production of cheap goods on a vast scale, the rise of the middle class to power, mass education, the aggressive sovereignty of big business, became dominant realities. In the artistic sphere, there were Beethoven and Wagner, Shelley and Musset, the countless romantic figures whose works celebrate a love of expansive looseness and freedom, disrupting the tight restricted moulds of the Papa Haydns and the Alexander Popes. In the sciences, the most distinctive triumphs, the works in which the era stood above others, were not in the studies of dead matter, but in the studies of living processes, in the works of Darwin and Mendel, and the myriad minor men, the Cuviers and Pasteurs. Even dead matter took on a surprising dynamic fluidity at the hands of the developers of the electrical theory, the Oersteds and Clerk Maxwells. The philosophy of the epoch was part of the prevailing cultural pattern. It was dominated by the dynamic categories of living things, and by the metaphysical concept of change or expansion, so-called evolution, and it reached its apotheosis quite recently, I think, in Bergson's *Creative Evolution,* Alexander's *Space, Time, Deity,* and Whitehead's *Process and Reality,* three works which interpreted all items of the real in terms of the creative advance, and evolution.

I write of this epoch as if it had already ended. In the various spheres of Western culture, the signs certainly indicate that it has about reached its end. In the economic sphere, lais-

sez-faire, free trade, and rugged individualism have given way and are giving further way to a more systematic and co-ordinated unity of economic effort. Loosely organized democracies and fallen empires have become transformed into strongly centralized collectivistic agencies. Security and self-sufficiency are the deities, not so-called progress. In the sciences, one notices the rise to first importance of the social studies. Knowledge of dead matter, even of living processes, is not enough. Also, one notices a co-operative international movement toward the unity of all the sciences, not to mention Einstein's single-handed effort toward a synthesis of physical principles. In the arts, mere disordered experimentation has abated considerably. At the same time, there is the rise of a new international architecture and, in general, a desire to employ recently got gains in socially conscious expression. All these signs point in one direction, the ascent of the concept of consolidation and organization over that of evolution and expansion. The idea of mere rugged animal advance, like the evolution principle in philosophy, still has adherents. But the idea appears to have lost the undisputed regency formerly enjoyed, and to be on the point of being displaced by something else.

What will rise to dominate the future? One can only conjecture, employing the available signs. Very briefly, my conjecture as to the future is this, that the most distinctive triumphs in the sciences will be in psychology and the social studies, that the arts will be imbued far more deeply with what is commonly called social consciousness, that political and economic affairs will be governed by systems which are consolidatory instead of expansive, communal instead of individualistic, emphasizing general welfare instead of mere unfettered advance, and that the philosophy of the future, as heretofore, will be part of the prevailing cultural pattern. This philosophy, I think, will stress the concept of sociality, inter-relation, structure, community, and the polarity of private claims and public processes within a comprehensively organized system. Should this last alone turn out to be the case, we could face the future with con-

siderable equanimity. Indeed, this book, with its stress on relationality or sociality and on the polarity of continuant self-determinacy and transeunt causal process within a completely ordered system, might be taken as a first awkward step toward the philosophy just predicted.

In this book, I have accorded primacy to the principles of permanence, change, and relationality, stressing relationality.

The first epoch of post-Renaissance Western philosophy emphasized the principle of permanence, so-called substance. The second epoch emphasized the principle of change, so-called evolution. In doing so, each epoch contributed to our lasting philosophical insight, each said something which we still hold true, and each reflected the *Zeitgeist* which passes with the historical advance. The philosophy of the epoch now opening, according to the above prediction, will emphasize the principle of relationality, or, structure, so-called sociality. In depicting the real from the standpoint of relationality, or, structure, it should also contribute its modicum of lasting philosophical insight, and barring omniscience, which presumably could depict the real from the standpoint of a timeless eternity unruffled by stress, this seems to me to be about all that one could ask.

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